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The Technique of a School Survey in Health and Physical Education

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A RECENT article[1] has pointed out very clearly the defects of survey techniques used in reports on health and physical education. The critical analysis made of the weaknesses in the method of reporting survey data in this field has been so thoroughly done that it need not be repeated, but since the weaknesses are so apparent and since data available are so meagre, it would seem entirely logical to attempt to formulate a technique which might serve as a start in the right direction. The problems which really confront us in a survey of this field are:

1. What information should a school survey staff in the field of health and physical education attempt to get?
2. Where, how, and in what form may this be obtained?
3. How shall it be interpreted and evaluated and of what use is it to the schoolman?

The technique given here is offered with some hesitancy and may bring forth considerable criticism, but, if it promotes definite thinking along the line of the development of a technique, its purpose will be served. Much of the material listed in the bibliography has been found valuable in formulating a technique and the outline form of the American Child Health Association for reporting the Study of the Secondary School Health Program has been particularly helpful. A careful combing of many of the later school surveys has given a number of excellent hints on technique.

DATA NEEDED—ITS ORGANIZATION AND PRESENTATION

PART I. GENERAL FEATURES

A. Description of school and community.

Before taking up the various divisions or aspects of either health education or physcial education, it will be valuable to give a brief description of the school or system including such items as these—

1. Size of city, type of community—nationality, economic, occupational, and social status.
2. Type of school—public, private, parochial, etc.

[1]E. C. Davis, "A Summary of 'A Criticism of Survey Technique in Health and Physical Education,'" Research Quarterly, American Physical Education Association, II: 2, page 27, May, 1931.

3. Number of pupils in each school of the system, both boys and girls.

4. Number of teachers as in (3) above.

This information is always obtained in a well-conducted school survey and will not be found under the heading of health and physical education. However, in surveying a school system only in regard to the particular field at hand, these data should be collected by the health and physical education surveyor. They should be available in the office of the superintendent of the system or in the office of the principal, in the case of a single school.

B. Legal aspects of health and physical education.

Another very important matter in connection with a survey in this field is its legal aspect. The surveyor must ascertain from the state laws and from board of education regulations in the particular system in question at least these minimum essentials:

1. What is the state school law regarding health inspection, medical inspection or examination of pupils, teaching staff and employees; the requirement in hygiene and physiology teaching; smallpox vaccination, etc.?

2. Are there sections regarding the employment of school nurses and the follow-up work which they must do?

3. Is there definite provision in the regulations of the board for the notification of parents in regard to defects found in the child?

4. What minimum time requirement is stated for physical education?

a. Is this exclusive of the teaching of hygiene?

b. Is physical education compulsory or permissive?

c. Are there any "jokers" in the law as is the case in Mississippi where the requirement is based upon the U. S. Government matching dollar for dollar with money spent by the state in carrying out the provisions of the law?

d. Are there any teeth in the law? Must a real education program be put on, or is the law similar to the one in Oregon, where the youngsters can run around the block and call it physical education or "get by" without doing anything at all?

The legal aspect of health and physical education is not often dealt with in surveys. Statements are made that medical inspection is given or that physical education is required five times per week, but one must go further to determine whether there is a law behind the practice or merely a board of education regulation.

C. Type of organization for health and physical education.

In regard to the general type of organization or set-up within the school system for carrying on the work, it will be important to note,

1. Whether there is one department, two departments, or a combined department controlling this field;

2. What the department is called;

3. Who heads it and the training of that individual;

4. What agencies in the city are promoting health and physical education aside from the school system;

a. How much overlapping is there and what has been done to bring about a coordination of these agencies with the work of the school? The work of the playground and recreation department and the park board should be mentioned in this connection.

PART II. HEALTH EDUCATION[2]

I. Objectives, aims and purposes in health education

1. Does the superintendent and do the principals and teachers seem to have a clear understanding of what we are driving at in health education? or, just what is the attitude? Is there a good health education attitude in the system or school?

2. Has a plan been developed for coordinating all the forces within the school that contribute to a health education program? or, is health education a "hit-and-miss" proposition?

3. Who is responsible for coordinating the health education program—an individual, a department, a faculty committee? Does it function? What has been the training of the individual or individuals?

4. Diagram the coordinating forces which operate in the matter of health education.

5. State specifically the plan in operation.

II. Health supervision

This material should be found in the offices of the superintendent and principals, by observation and by questioning teachers and pupils.

A. The hygiene of instruction, that is, the hygienic arrangement and administration of the school program from the point of view of both teacher and pupil.[3]

1. For the pupil.

a. How long is the pupil's school day?

b. How is the time apportioned to the different types of school work?

c. Does the daily program offer any opportunities for recreation aside from the required physical education period?

1′. Do pupils use these opportunities and, if so, how?

d. Is home study required and, if so, does the plan take into consideration the amount of sleep and recreation needed by children of various school ages?[4]

e. School lunch.

1′. Does the school have a problem on account of the distance between school and home?

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[2]The divisions or aspects of health education are those outlined by Dr. Williams in *The Principles of Physical Education*, Preface pp. x, xi.

[3]Adapted from the American Child Health Association Outline for Reporting the Study of Secondary School Health Education Program.

[4]J. F. Williams, *Principles of Physical Education*, p. 85.

2′. Qualifications of individual in charge of the lunchroom?

3′. What are the principles underlying the selection of food for sale in lunchroom?

4′. Is the lunchroom utilized as an educational factor in health education? Are such factors as time allowed for lunch, cleanliness of room and service, seating and lighting facilities carefully considered?

5′. Does the department of home economics sanction the catering at school parties and food sales, etc. for raising funds?

f. If the general morale of the school contributes to the health education program by giving pupils poise and self control through self direction, attempt to determine how this is done and what individuals are really back of it.

g. What provisions are made for the physically handicapped pupils —eye, ear, etc., defects?

1′. Are teachers notified about such defects or about other handicaps so that a proper seating arrangement may be maintained or so that special consideration may be given?

2′. Are provisions made for temporary disability?

2. For the teacher:

a. Determine the hygienic facilities available for teachers in relation to rest rooms, lunch, etc.

b. Is rest taken into consideration in arranging the teacher's schedule?

c. If teachers take after-school responsibilities, is the load equalized among them, are their after-school activities taken into consideration in classroom assignments, and are teachers' own needs for recreation taken into account?

d. What responsibility, if any, does the school take in regard to the living conditions of teachers?

B. The sanitation of the plant—lighting, ventilation, cleaning, etc.

Although this is a feature of health supervision, it is almost universally discussed under the heading of buildings and no doubt rightly so. Hence it will not be necessary to repeat the technique under health and physical education. Some important items which are not mentioned in many surveys might be cited. The Boise Survey,[5] for instance, brings out these points.

1. Location of buildings is important from the standpoint of health and play facilities. Is care taken in regard to freedom from smoke, soot, railroad and highway crossing, etc?

2. Is the orientation of buildings and division of site according to the efficient use of ground for play purposes considered?

3. Situation of heating and ventilating intakes to prevent picking up clouds of dust and dirt by the fans and blowing them into the classroom?

4. Boise's drinking fountains are all indoors. The need for many out-

[5]J. B. Sears, Director, *Report of the Survey of the Public Schools of Boise, Idaho,* (Yonkers-on-Hudson, New York: World Book Co., 1920.)

door fountains on the playground is pointed out and a standard set at one drinking fountain for every 75 children.

III. Health service

If available, data on health service will be found in records in the offices of the superintendent and principals, school health records, and information secured from doctors, nurses, and teachers.

In connection with this feature of health education, a quotation from Williams[6] will be in order:

> "Under this division there are numerous subdivisions. They can be enumerated as health examinations, specific protective measures against disease, such as vaccination against smallpox, inoculation against diphtheria, etc., first aid services in the school, follow-up of recommendations for correction of defects.
>
> "It is the lack of this service in the school that accounts for the occurrence of 30 to 40 per cent of unfitness in the young men of the nation in 1927. While arguments for the purpose of passing a congressional bill may cite the function of physical education in relation to national preparedness, it is the plain truth of the matter that only a few of the defects as causes of rejection have even a remote relationship to physical education. It is the generally absurd medical inspection, with its superficial, production-schedule examination, that is the responsible party. Hernia, flat feet, and deficient chest expansion have relationships with physical education, but, again, these are items to be examined by an efficient health service."

A. General features. (Obtain information at superintendent's office.)

1. Medical staff.

a. What is its composition and organization?

b. Obtain the following facts in regard to the medical examiners: training, length of service, salaries, service rendered, duties.

c. What clerical help is provided?

2. Nurses.

a. Obtain facts as under (a) and (b) of medical staff.

b. What are their duties in relation to the health examination?

c. What are their duties in relation to classroom and building inspection, follow-up work, home visitation, reports, etc.?

d. If transportation is provided, give the arrangement for this.

e. What is the nurse's relation to health instruction?

3. Equipment.

a. What equipment is available in individual schools or throughout the system for the successful administration of the medical examination?

b. What equipment and supplies are available for emergencies and first aid?

4. School clinics.

a. What types have been instituted, i.e., eye, dental, ear-nose-throat, orthopedic, etc.?

b. What is the general organization and what are the cooperating agencies?

c. What equipment is available and by what organization provided?

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[6] J. F. Williams, *Principles of Physical Education*, Preface p. xi.

5. Open-air schools.

a. What provisions of this nature have been made?

b. What is the organization and cost?

6. Nutrition classes and school feeding.

a. Is there any provision for the undernourished child? If so, get the detail.

b. Have any studies been made along this line in a school or in the system? Cite the study or studies?

c. Are outside agencies interested in this movement, for example, do such organizations as the P.T.A. provide milk?

B. The health examination.

1. Medical (or physical).

a. Are medical examinations given? To teachers? To pupils?

b. Purpose and detail of the examination?

c. Procedure.

1′. By whom administered and with whom present? That is, are parents invited to be in attendance?

2′. When and how often are examinations given?

3′. Are special rooms provided? If not where is the examination given?

4′. How many pupils are examined by how many doctors and nurses per hour?

5′. What do pupils wear? Are they stripped to the waist?

d. Records.

1′. Show all record forms used.

2′. By whom are results recorded?

3′. Is there provision for cumulative record?

e. Interpretation and follow-up.

1′. By whom are results interpreted?

2′. Do classroom teacher, physical education teacher, and parent get a copy of results and interpretation with advice for the future well-being of the physically maladjusted pupil?

3′. What is the plan for correcting physical or functional handicaps?

4′. What data are gathered as evidences of correction?

5′. Are there peculiar conditions in the particular school or system under survey which ought to be brought to light?

2. Mental health.

a. Are feeble-minded suspects referred to a (or the) psychologist for a mental test?

b. Obtain data on method of procedure in suspect cases. For example, tests used, procedure used, qualifications of the examiner, scoring and recording of tests, interpretation and follow-up.

3. Emotional and social health.[7]

[7]Adapted from the Outline Form for Reporting the Study of the Secondary School Health Program, American Child Health Association.

a. What provisions are made for the healthy expression of the emotional life of the children?

b. Is any attention given to social adjustment?

c. Are there provisions for recreational guidance?

d. "How is student participation in extra-school activities guided so as to secure the maximum health value, mental and social as well as physical"?[8]

e. What provision is made for diagnosis and care of psychotics and the emotionally unstable?

4. Are the results of the health examination, mental and physical, used as aids in social guidance? Are health records used as guides in directing the pupil's occupational activities when he leaves school?

C. Protective measures against the spread of disease.

1. How and by whom are the problems attendant upon the prevention of contagion handled?

2. Do the classroom teachers make daily inspections and refer suspects to the nurse or send them home? How are common colds handled?

3. Have any studies of absences due to illness been instituted and, if so, what use has been made of them?

4. Does cooperation exist between school physicians and country and city health officers?

D. Cost of the service.

1. If data are not available as to per pupil cost of health service, these should be gathered and costs computed. Data should be obtainable readily in the office of the superintendent and the following items must be considered in obtaining a figure for the total cost of the health service:

a. Salaries of medical staff and nurses.

b. Interest and depreciation on equipment.

c. Incidental expenses which will include medical and first aid supplies, cost of transportation for nurses in home visitation, record forms, and cost of record keeping.

d. Possibly part of the time of the psychologist should be included.

These figures will be very valuable for comparative purposes, both in and out of the system.

E. Results of the health service.

This information is very difficult to secure but if information were properly kept, reports in the offices of the superintendent and of the medical supervisor ought to give much of it.

1. Has the system a plan for measuring the results of its health service? If so, state it?

2. Is the health service working for 100 per cent cure?

[8]Outline Form for Reporting the Study of the Secondary School Health Program, American Child Health Association.

3. Secure data on the following:

a. How many children examined, inspected, treated, excluded, cured?

b. How many various ailments found? How many treated? How many cured?

c. How many teeth repaired, eye defects corrected, etc.?

d. Draw a comparison, if possible, in several lines on the decrease in various contagions and infections since health service was instituted.

e. How many recommendations to parents have been followed up and the condition relieved or cured?

f. How many assigned to different seats because of eye or ear defects?

g. Sears[9] says, amount of sickness, number excluded, number of home visits made, etc., are in a way indices of efficiency.

4. What has the health service done for the school? It costs so much, it has done so much. From an actual monetary standpoint, is the health service worth the price? Draw a comparison between cities of the same size if possible.

IV. Health instruction.

Some data may be secured from courses of study in hygiene and from questioning samplings of teachers who are connected with subjects offering possibilities for health instructions.

In general this phase of health education means the development of good health habits, desirable attitudes and practical knowledge.

1. Where does the responsibility for health instruction rest in the elementary and high schools?

2. Is there correlation between various departments and who sees that this correlation is worked out? For example, in the high school certain specialized departments have an opportunity to provide scientific information which may be applied to health problems: social sciences, biology, general science, physics, chemistry, home economics, and related subjects as nutrition, home nursing, and first aid.

3. What special means are used to interest children in matters pertaining to health? What applications are there to daily health habits and modes of living? Are there after-school agencies such as clubs, Modern Health Crusades, etc., to enlist the interest of pupils in health matters?

4. Evaluate the course of study in hygiene. Is it vital and wholesome? What results related to personal and community health, either in habits, attitudes, or knowledge seem to be achieved? Are the results of a "health knowledge and habit" test available? In other words, is there evidence that health instruction is forming effective health habits?

Final Recommendations

These should come under the three heads cited (i.e., II, III, IV) and in the case of II may include a number of factors. Is the school system

[9] J. B. Sears, *The School Survey.*

doing its job and how can the service rendered be improved? Commendation and censure should be injected where it is needed.

PART III. PHYSICAL EDUCATION

I. Legal basis.

This has been covered under Part I, general features.

II. Objectives, aims and purposes.

Secure these data from the course of study if there is one, and from questioning those in charge of physical education.

A. What is meant in the school system by *physical education?*

B. Are specific aims set down? What are they? How closely do they correspond, for example, to those set forth by Williams and Nash?[10]

III. Curriculum content.

Secure data from course of study and from observation of class work. Answers to some points may be secured from teachers.

A. Is there a course of study?

B. Is the program graded and progressive to meet the needs of children at various age periods?

1. What uses are made of the results of the physical examination in planning the physical education program of an individual?

2. Is posture emphasized? How is it measured?

C. A more detailed study should be shown here as to who is required to take physical education, with the provisions for those for whom it is a requirement as against those for whom it is elective.

D. A number of factors will enter into the curriculum in physical education. These should be carefully noted and an evaluation placed upon the class work on this basis. Besides aims, the influencing factors include:

1. Ground space (special survey section).

2. School time allotted to physical education.

If time provisions for shower and dressing after exercise are not provided, the program will be seriously affected.

3. General weather conditions. A program which may serve admirably in Southern California is not possible in the east and middle west, or west, or even in Oregon and Washington.

4. Size of group in class work; teacher load.

5. Facilities—besides ground space, equipment is necessary. Gymnasiums and play sheds must be taken into account; also apparatus (see special survey section).

E. Organization of children.

1. What arrangement is made for grouping children in individual

[10]See J. F. Williams, *Principles of Physical Education,* Preface pp. xiii to xvii, and Jay B. Nash, *The Administration of Physical Education,* Chapter VI.

sections according to skill, or according to the four-point classification—age, grade, height, weight, etc.?

2. Are children of varying levels of ability thrown together?

3. Method of grading students in physical education.

F. A study should be made of the after-school activities for the masses—that is, intramural sports.

1. What activities are carried on? By whom handled?

2. How are they organized? What are the competitive units?

3. What percentage of the boys and girls in each school and in the system do they reach?

G. Records.

What sorts of records are kept of necessary information on the boy or girl, such as, height, weight, age, results of achievement tests, etc.?

IV. Inter-school or interscholastic athletics.

It will be possible to secure data from the superintendent, principals, and physical education teachers.

Because of the scope of this phase of physical education and the widespread public interest in it, a special section has been assigned to it.

A. Type of organization.

1. In the individual school.

a. The controlling element should be noted, that is, the composition of the controlling board—faculty and students.

b. The tie-up with the student body organization.

c. The financial status—sources of revenue and disbursement, the financial head, budget making, cost of athletic program.

2. In the school system or league.

(a) Composition of controlling body. (b) How are schedules made and carried out? (c) Detailed work of this board.

B. Scholastic requirements for competition.

1. What are they and how are they enforced?

2. Is there pressure to keep athletes eligible?

C. Medical supervision of competing students.

(1) By whom examined? (2) How often? (3) Is there a physician on the field during competition?

D. Connection of athletics and the physical education program.

1. Is interscholastic competition a part of the physical education program?

2. By whom are teams coached? Is the coaching made educational? Who is held responsible if the coaching is not educational?

3. Number of individuals in each sport who receive regular instruction?

E. Control of athletic fields.

1. Do educational authorities exercise control over competitive fields at least during competitive periods?

2. Who is responsible for crowd control? Are there disgraceful scenes at athletic contests where crowds surge down on the field, etc.?

F. Award system.

1. Give detail on eligibility for awards.

(a) Boys or girls or both? (b) Awards for activities other than athletics?

2. Type of award.

3. Manner of determining awards.

V. Facilities, Equipment and Supplies.[11]

Data to be secured from actual measurements and from observation and questioning.

A. Area of school site.

Data on this may be secured from the report in another part of the general survey. The number of acres of play spaces in usable units should be carefully noted and the usable acreage for each school with the enrollment in that school should be given in tabular form.

B. Placement of building on school site.

Data on this point is given in most cases under "Buildings" in the general survey. However, two special points should be noted:

1. Is play space badly broken by buildings?

2. Is play space broken so that fields and courts cannot be laid out correctly as to direction and size?

C. Outdoor facilities.

Size of play spaces, separating those for boys wherever this is the school practice?

2. Surfaces of fields and their adequacy in this regard?

3. Care and upkeep; provisions for laying dust or draining of water, etc.?

4. Courts and fields.

a. What courts and fields are available?

1′. List courts as basketball, tennis, handball, volleyball, etc., and give sizes.

2′. List fields as baseball, football, soccer, speedball, track, etc., and give sizes.

3′. What special pits are provided such as jumping pits, etc.?

b. What special features are provided such as, croquet courts, archery lanes, golf driving cages and putting greens, horseshoe pits, etc.?

5. Apparatus.

a. List playground apparatus available.

b. Determine value on basis of usefulness, safety, supervision needed, expense, and space available.

6. Seating facilities.

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[11]Adapted in part from *A Score Card for Evaluating Physical Education Programs for High School Boys*, Bulletin No. E-2, California State Department of Education, Division of Health and Physical Education, pp. 12–23.

a. What provision has been made?

(1′) Capacity? (2′) Toilet facilities at game times?

7. Fencing provisions.

8. After-school and evening use.

D. Indoor facilities.

1. Sizes of gymnasium and play sheds?

(a) Compute number of square feet per pupil for both boys and girls. (b) Use or utilization—percentage. (c) Include under this heading also such rooms as are used for apparatus, individual exercise (corrective), etc. (d) Seating facilities in the gymnasiums.

2. Locker and shower facilities.

(a) Size and type of lockers. (b) Number of lockers. (c) Showers—number showers per pupil in largest class.

(1′) Floor and walls. (2′) Light, heat, ventilation, sanitation, and drainage. (3′) Dry room.

3. Swimming Pool.

(a) Indoor or outdoor; size and depths? (b) Deck and pool tiled? (c) Give detail on pool fixtures, runways, and sanitary provisions such as heating, filtration, and sterilization. (d) Provision for spectators.

4. Sanitary facilities.

(a) Location, number, type, provision for ventilation, etc. (b) Fixtures such as soap containers, paper towels, drying machines, mirrors, drinking fountains, etc.

5. Auxiliary rooms and offices—size and special provisions.

(a) Classrooms. (b) Rest rooms. (c) Special rooms for first aid, physical examinations, etc. (d) Supply room for towels, playground, and gymnasium supplies, etc. (e) Staff offices. (f) Visiting team rooms.

E. Equipment.

1. Detail on pieces of apparatus available for,

(a) Gymnasium. (b) Individual gymnastics room. (c) Track—standards, hurdles, etc. (d) Physical examination equipment such as scales, stadiometer, calipers, etc. (e) Care of equipment?

2. Supplies available.

(a) By whom furnished? That is, are these furnished by the board of education or by some arrangement within the individual school? (b) List yearly supply or supply per hundred pupils. Is the supply adequate? (c) Supplies for first aid. (d) Care of supplies?

F. Gymnasium and athletic clothing?

(1) By whom owned? (2) Fee for rental? (3) Articles included? (4) How administered?

VI. The teaching and supervising staff.

It should be possible to secure data from the superintendent, principals, and by questionnaires to teachers.

A. By whom is the physical education program carried out?

(1) Classroom teachers? (2) Special teachers? (3) Teachers in the after-school periods?

B. What professional preparation have the teachers had for this work?

In this connection a table will show the detail to advantage. List the number of teachers with years of special training, experience, where the training and experience was gained, recency of further training, special qualities of physical fitness, etc. Are there evidences of inbreeding?

Show by chart or table evidences of professional growth in the personnel. Such things may be considered as membership in professional organizations, attendance at professional meetings, library of professional books, subscriber to professional magazines, etc.

C. What are the duties of classroom and special teachers in connection with the physical education program?

D. Training of supervising staff.

E. Duties of supervising staff.

VII. Cost of the program.

Obtain data from superintendent's office but make own computations.

A. The teaching cost and the instruction cost will not be difficult to obtain, but the total cost per pupil may be very hard to estimate on account of the difficulty of obtaining an evaluation on land, etc., for play purposes. This, however, should be undertaken. The total cost will include:

(1) Teaching, supervising. (2) Special buildings. (3) Equipment. (4) Supplies.

B. In the Philadelphia School Survey[12] another cost idea has been worked out. This involves computing the percentage of the school dollar which goes for physical education in the elementary schools and in the secondary schools. The number of children involved is taken into consideration in computing each of the percentages.

VIII. Standing of the pupils.

Obtain data from physical education teachers and from record cards of the pupils. Standardized achievement tests for pupils in the elementary and high schools are rare. The varying equipment and program offered to students in these schools make it almost impossible to compare the achievement of one group with that of another. However, there are two tests in the field which are possibilities for use, namely, the Brace Motor Ability Scale[13] for elementary and high schools, and Rogers' Physical Capacity Tests[14] for high school boys and girls. The latter tests require

[12] *Report of the Survey of the Public Schools of Philadelphia.* Made by the State Department of Education, Philadelphia; The Public Education and Child Labor Association of Pennsylvania, 1922.

[13] D. K. Brace, *Measuring Motor Ability.*

[14] F. R. Rogers, *Physical Capacity Tests in the Administration of Physical Education.*

special equipment which, though not particularly expensive, is not to be found in many high schools. There are numerous standards of achievement worked out for various ages and grades of boys and girls which might be used. Particularly should be mentioned the Philadelphia age-aim charts,[15] the standards of Bliss,[16] and the National Physical Achievement Standards.[17]

In commenting upon the lack of standards of measurement in physical education in connection with the survey of the schools of Port Arthur, Texas, Williams[18] has this to say:

"It so happens that Port Arthur has spent considerable money for equipment for physical education and considers it one of the recognized school subjects, and yet there were no tests in physical education available for survey that were comparable in a scientific way to those in the list cited." (He refers here to a list of recognized school subject tests previously cited in the chapter).

"If achievement in physical education activities is of any importance it seems obvious that it should be measured. Achievement in physical education has not been included, partly because of a lack of objective standards, and partly because such standards as we now possess have been seldom used in evaluating achievement.

"The fault lies primarily with workers in physical education. It is they who have failed to recognize and standardize the desirable outcomes of instruction in the subject. Physical educators have been prone to defend favorite systems of opinion instead of objective experimental evidence."

IX. Evaluation of the Program.

A general summary should be made here noting whether or not the children find the program stimulating. The following question may serve as a guide—does the program contain all the elements necessary for a well rounded program? Wherein is it lacking? In some surveys[19] this feature was handled by means of a questionnaire to samplings of students, asking them what was their best-liked activity in school and comparing this with their preferred activity during leisure time. In other words, what we want to know is—"is the program going over"; does it fill the needs and desires of the boys and girls; what evidence is there that during leisure hours the pupils make use of activities taught as part of the physical education program? If the program does not meet the needs, how can the situation be remedied?

X. Needs of the system.

The items under this heading will, of course, be listed under the general heads, such as organization, curriculum content, equipment, teachers, and so on.

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[15]See J. F. Bovard and F. W. Cozens, *Tests and Measurements in Physical Education*, p. 85.

[16]James G. Bliss, "A Study of Progression Based on Age, Sex, and Individual Differences in Strength and Skill," *Am. Phys. Education Rev.* XXXII (1927), 11.

[17]Published by the National Recreation Association, 315 Fourth Ave., New York City, 1931.

[18]J. F. Williams, *Principles of Physical Education*, p. 443.

[19]See Boise Survey, *Op. Cit.*, and George S. Strayer, Director, *Report of the Survey of the Schools of Hammonton, New Jersey.* New York: Inst. of Ed. Res., Div. of Field Studies, Bur. of Pub., T. C., Columbia, 1926.

INFLUENCE OF THE FINDINGS ON SCHOOL PROCEDURE AND SCHOOL POLICY

School surveys are designed for but two purposes, either to justify a school procedure or to modify it, and, if modification is advocated, it must be on the basis of recorded facts. The question may well be put—how will a survey such as has been outlined modify school procedure and policy in relation to health and physical education? The answer to this question may be summed up as follows:

1. In the case of such a new field as health and physical education, the purposes and aims must be carefully pointed out. If the particular school system is to be in accord with the purposes and aims as set forth by the nation's best thinkers on this matter, adequate direction is necessary. The detail of the director's job will have to be shown. His worth to the educational scheme must be clearly set forth. The results secured by cities having a director of health and physical education ought to be presented.

2. Inadequacies, if any, in the matter of health supervision for both pupils and teachers, the sanitary condition of buildings, etc., may be pointed out by noting conditions found and offering suggestions for remedying situations which are not wholesome.

3. Health service may be justified on the basis of cost to the community in loss of school time by pupils through illness and of loss to the community due to the inefficiency of a pupil who has a defect not known by the school, the parent, or the child. If health service is already established, inefficiencies in its operation should be pointed out. These may include any or all of the following:

a. That the examination is so superficial as to be nothing more than might be obtained by a teacher making a classroom inspection.

b. That defects of children are not reported to teachers and hence no provision is made for special care.

c. That the efficiency of doctors and nurses is hampered by a heavy load of clerical duties which may well be performed by a clerk, and thus allow highly-paid specialists to devote more time to specialty work.

d. That nurses could do three times as much visitation work if they were provided with transportation.

e. That the school system does not know what it is doing or what it is accomplishing because it has inadequate records.

f. That nurses are of great value but that part-time medical examiners are of little value.

g. That friction between the school health service and the city and county health officers is working to the detriment of the school system.

4. The surveyor should be careful to set forth,

a. The forces which may be coordinated for health instruction;

b. The best means of securing interest in this matter;

c. The delegation of responsibility for coordination together with an evaluation on the basis of observed attitudes and knowledge.

5. One of the best ways to determine whether the curriculum content in physical education is usable for the situation is to find out whether the youngsters like it, or whether it is a bitter pill. Does it contain material which seems to be vital in the play life of the youngsters?

6. The adequacy or inadequacy of gymnasiums or play fields must be determined on a per-pupil space basis for the largest group that is on the floor or field at any one time. What activities other than setting-up drills can be carried on in an area of 30 sq. ft. per child? Playground equipment may be evaluated by means of four criteria—usefulness, expense, safety, and supervision needed.

7. In order to be of value to a school system, interscholastic athletics must be carried on under the direction of men and women in physical education who are specially trained for their jobs. The school would never think of hiring an outsider to teach history, mathematics, or science. Why pawn off the outsiders on physical education? Statistics, showing the number of permanent injuries in athletics due to lack of medical supervision, should be cited if the medical supervision item is neglected. Insistence on high standards of scholarship for those competing on school teams will raise the educational morale of athletics and do much toward improving adverse conditions.

8. Trained teachers are essential in all subjects. One of the greatest distresses of physical education in the past has been that *any old thing in the way of a teacher* has been wished off on it. The majority of classroom teachers will admit that they have no interest in teaching physical education and merely do it because they are forced to do so. This condition does not make for efficiency and the establishment in children of wholesome attitudes toward play life.

9. The cost of the program of health and physical education may have more effect on many interested lay persons than anything else. Data on costs should be presented and compared with other school subjects and other systems, if that is possible.

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The Survey and Professional Preparation in Physical Education*

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IT HAS been observed that disagreements often arise between groups of persons because different interpretations are placed upon the meanings of terms rather than because of any differences in basic philosophies. The word "survey" is being used today to designate a rather wide range of methods of problem-solving. In the press and in some of our professional periodicals, the word "survey" is used almost as loosely and recklessly as the word "scientific." Specialists in health and physical education also differ in their understandings of "the survey." Some of them consider it merely a "review" or "summary." They speak of a survey of the literature or a survey of a book. Other health and physical educators limit the survey to a *careful study of the existing conditions and needs of situations or persons, so that these conditions may be justified, or recommendations made for improvement.*

This interpretation immediately infers that several research techniques are to be utilized in, and become component parts of, a survey. Different combinations of these research techniques are used to construct different types of surveys. Throughout this paper the survey is understood to include different combinations of such methods.

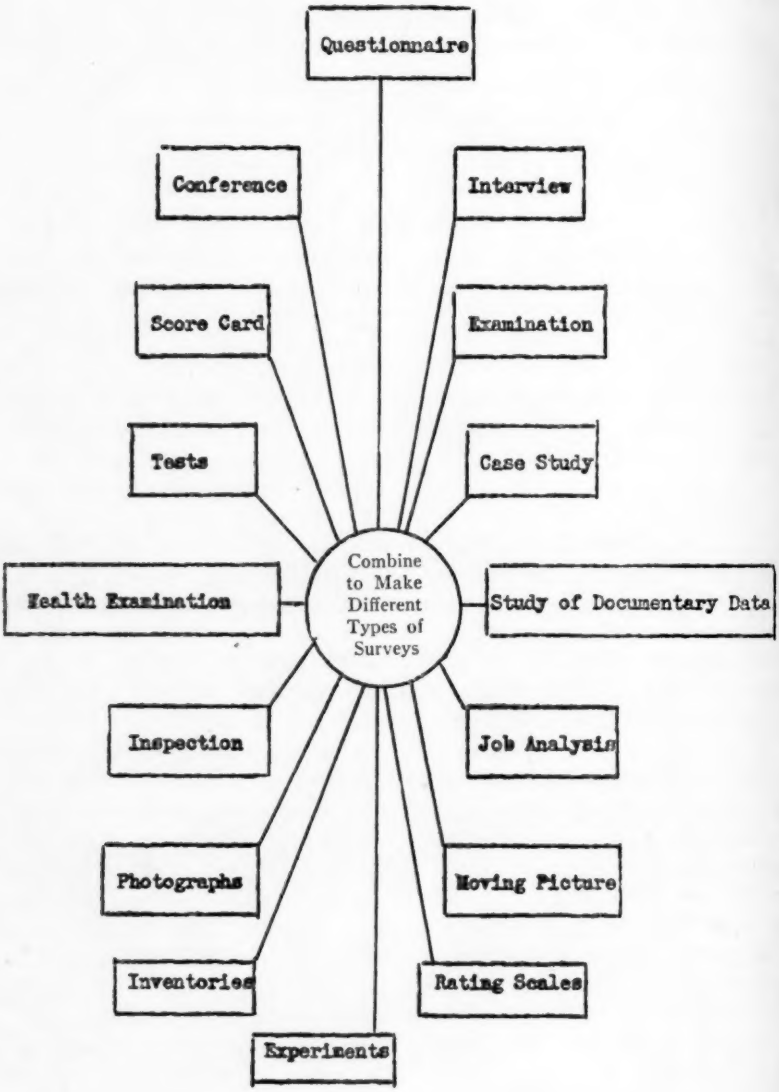
THREE GENERAL TEACHER-TRAINING PROBLEMS

As a part of the preparation of this paper, letters were sent to ten persons who are in intimate contact with teacher training in physical education in different sections of the country. These experts were asked to list the outstanding problems in the direction of the professional preparation of physical education teachers. About forty different problems were listed by these ten directors of teacher preparation. These have been classified into the following three categories:

1. Problems related to the selection of prospective students.
2. Problems related to the content and teaching of the professional curriculum.
3. Problems related to the placement and in-service follow-up of graduates.

*Address delivered before the Southern Division of the American Physical Education Association, Jacksonville, Florida, April 1, 1932.

The following diagram suggests the techniques available for use in surveys:



These are essentially the same general problems as those presented by Professor C. L. Brownell to The Society of Directors of Physical Education in Colleges in 1928.[1]

THE PROBLEM OF GOOD TEACHING

A fourth category might be added to this list; namely, those problems related to the determination of what constitutes *good teaching*. This latter problem appears to be fundamental to any type of teacher preparation. In fact, workers in educational research consider it a major problem in teacher training today. Has not our teacher training in the past been based upon the assumption that we can readily recognize good teaching? The fact is that we in physical education, like those in other phases of education, have not solved this problem. The recent award of one thousand dollars offered by Kappa Delta Pi for a measurement of efficient teaching illustrates the position of one professional group regarding the need for good standards of judgment. Furthermore, the Carnegie Foundation for the Advancement of Teaching has granted $20,000 to the American Association of University Professors for a survey, the purpose of which is to define good teaching in colleges and improve its present status.

It is difficult for physical education to justify its present position of graduating hundreds of teachers when there is no *precise* idea of what constitutes good teaching, and therefore no indication of whether or not we are training good teachers. In a recent interview with an official in a state department of public instruction, this statement was made: "In spite of the fact that there are many physical educators without positions we can place every *good* physical education teacher, if such there be. As a matter of fact, we are eagerly looking for them."

In an attempt to aid in the solution of this problem of good teaching, it is suggested that a survey be made of the opinions of *qualified* physical educators regarding the essential factors in good teaching. The questionnaire, interview, and conference are suggested techniques of collecting this information. The conference method as an aid in the solution of problems involving personal opinions was successfully used by the Committee on Curriculum Making of the National Society for the Study of Education, as reported in the *Twenty-Sixth Year Book* of that Society. Furthermore, the questionnaire, interview, and conference have been effectively used by the White House Conference on Child Health and Protection.

Recently a member of our profession seriously objected to the use of such techniques. He said, "But the questionnaire, conference, and interview are not scientific. They are not accurate. They do not yield precise results. They do not attain to the highest in science or the scientific method."

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[1] C. L. Brownell, "Preparation of Students for College Programs of Health and Physical Education," *Proceedings of The Society of Directors of Physical Education in Colleges*, December 27, 1928, page 10.

Such a point of view is not uncommon among certain research workers. Is it not high time that we in physical education, education, and the other social sciences recognize that most of our methods and ideas of how to use these methods, have been *borrowed* from the exact sciences?[2] Our *ideas* about science and what is scientific have been borrowed from the natural and physical sciences. It is little wonder that these borrowed methods and techniques have proved *ineffective* as they have been applied to the social sciences. The respectful mysticism in which the exact sciences have been enshrouded has not encouraged the development and refinement of methods in the social or life sciences.

The nature and content of the exact sciences, over a period of hundreds of years, has made it possible for scientists to develop fairly *precise* methods and techniques. The variable and unpredictable nature and content of the social sciences has made it extremely difficult for workers in these fields, within a period of a few years, to develop anything but *inexact* methods and techniques. The progress of the social sciences is dependent to a large extent upon the usage, refinement, further usage and further refinement of methods and techniques specifically devised for these fields.

Following a satisfactory solution of the philosophical aspects of what constitutes good teaching, the survey may be employed in the collecting of materials and methods which have proved helpful to superior or good teachers. A survey of this type is under way in general education at the present time. Professor W. A. McCall, Teachers College, Columbia University, is making a nationwide survey of the units of instruction and the teaching techniques which have been used by master teachers in the various subject-matter fields.

THE SELECTION OF PROFESSIONAL STUDENTS

After actual standards and techniques of good teaching have been determined, we are ready to set about looking for young people who seem to possess the requisite qualifications.

The selection of prospective major students in physical education is a problem of immediate concern to directors of professional training. What types of qualifications should be required of these prospective major students? What methods of control should be initiated in order to regulate the number of students entering the profession? Another problem which faces the director of teacher training is that of determining the factors that should be operative in deciding whether or not a student should be permitted to continue with his professional preparation after he has been accepted as a major student. How can the survey aid in arriving at solutions to these problems?

In the first place, the director of professional preparation should be

[2] John Dewey, "Social Science and Social Control," *The New Republic*, Vol. LXVII, No. 869 (July 29, 1931), pages 276-278.

familiar with certain facts regarding the secondary schools from which the prospective major students are graduated. At the present time the Department of Education in the State of Alabama is conducting scores of surveys which include, in part, information regarding the programs of health and physical education in public schools. Surveys of the physical education programs, personnel, and facilities and equipment of the various secondary schools[3] that are sending students to college for professional preparation in physical education, should prove to be especially helpful in indicating the physical education *backgrounds* of these prospective students. Some type of score card is another technique that may be added to those already suggested in such surveys. The score cards developed by Directors C. M. Miles of Florida and N. P. Neilson of California are examples of such techniques which have already been worked out for the evaluation of public school programs of health and physical education, *for other purposes.*

High school records of intellectual and academic abilities, high school and college health examinations, family history, and tests and measurements in health and physical education are further data which should prove vital in the selection of students. The survey of the individual should also include ratings of his social achievements as well as his former social environment and background. The questionnaire, interview, and an adaptation of the case study are other techniques that may be used to secure further information regarding the student's social background.

Ashbrook[4] has suggested a series of examinations for use in the selection of major students. These may prove to be an effective method of selecting students for teacher training in physical education.

Some directors of professional training consider the student's "physical" personality as an essential consideration. While physical personality may be appraised by means of observation, additional evidences of the student's *whole* personality should be secured by means of the more widely used and accepted personality tests, scales, and inventories.

A thorough survey of the student is not complete without a prediction of his probable teaching ability. There is need at the present time for such prognostic tests in physical education.

The head of professional training may be further aided in solving problems related to the selection of major students by the dissemination of information regarding the possibilities in, and professional aspects of, physical education. It is only fair that the prospective major student be made familiar with the pertinent facts regarding the profession of which he hopes to become a member. Such information is not available at the present time in convenient form although a distinctive contribution to-

[3] E. C. Davis, *Methods and Techniques Used in Surveying Health and Physical Education in Public Schools,* Bureau of Publications, Teachers College, Columbia University. 1932.

[4] W. P. Ashbrook, "A Selective Student Examination Prior to Training in Physical Education," *The Journal of Health and Physical Education,* Vol III, No. 2 (February, 1932), page 18.

ward this end has been made by Scott[5] in his personnel study of college directors. This type of personnel study, together with the job analysis, should be expanded and extended so that we may be enabled to give intelligent information regarding the qualifications needed for successful physical educators. Prospective major students should also know the vital facts regarding the present status of physical education in the United States. The continuous and periodic surveys appear to be practicable ways of securing accurate professional information that can be kept up-to-date.

Even though it is assumed that all of these types of surveys are effectively conducted, the person in charge of professional training is justified in asking, "Shall we definitely accept the student who passes through these various tests of selections or shall we place him on probation for a year or two?" Because of the many problems and adjustments which the student faces in the first year of his college education, the probational plan is worthy of consideration.

After a student is accepted, surveys should be made of his aptitudes, interests, and needs, throughout the four undergraduate years. A further question which arises in a consideration of the selection of students is, "Shall we select the student on the basis of tests, rating scales, job analyses, and the other scientific methods which are used in the surveys mentioned above?"

Administrators who immediately change policies and make decisions as direct outcomes of the results of tests, scales, and other similar techniques, cause considerable embarrassment to careful test-makers and research workers. As Dewey has pointed out,[6] the sane relationship between scientific results and administrative policies is that of using the data as *guides to further thinking and reflection* rather than as stimuli for "rules of practice" or immediate action. The director of professional preparation in the selection of prospective students should use the results of the tests and rating scales only as guides in his decisions, "as intellectual tools in his empirical procedures." That is, they direct his attention in both observation and reflection, to conditions and relationships which would otherwise escape him.[6] It seems clear that *no scientific* method in education has yet been devised to supplant human observation, common sense, and careful judgment—although the results of carefully constructed, carefully selected, and carefully used scientific techniques have proved to be valuable guides.

NEED OF IMPROVEMENT IN THE PROFESSIONAL CURRICULUM

After determining the nature of good teaching, and after the selection of students, we are prepared to consider a curriculum which will prove the opportunity for these students to become good teachers.

[5] H. A. Scott, *Personnel Study of Directors of Physical Education for Men in Colleges and Universities*, New York: Bureau of Publications, Teachers College, Columbia University, 1932.

[6] John Dewey, *The Sources of a Science of Education*, New York: Horace Liveright, 1929, page 30.

At the present moment the content and teaching of the professional curriculum is receiving most serious attention of those interested in the profession.[7] There seems to be agreement among both general educators and physical educators that preparation of physical education teachers needs up-grading. The physical education programs in many of our public schools are indicative of this need. It is true that there has been new cloth added to the old garment in the form of the "Natural Program." However, some of the general educators accuse us of permitting the popularity of this newer program to conceal the fact that the teaching and leadership abilities of some of our instructors have not kept pace with the content. It has been said that some of our departments of teacher preparation are little more or less than coaching schools—and poor ones at that.

How do other fields prepare their students for service? In our finest medical schools the students who show unusual promise as surgeons spend an additional two or three years in observation and assistance after graduation before they begin to take the responsibility of operating under supervision—the entire professional preparation often takes eight, nine, or ten years. In our departments of professional physical education we attempt to turn out instructors in four years, or less, who are expected to teach others how to *live!* It seems reasonable to assume that the training of those who are dealing with life at its best should be at least comparable in quality and quantity to that of those who deal merely with the pathological phases of life. It has been our negative fearful approach to life which has made us think otherwise.

A head of professional training now asks this question, "In what ways can the survey aid in the improvement of the content and teaching of the professional curriculum? For instance, how can a survey help lessen the gap between the professional curriculum and actual conditions in the field?"

It has often been charged that in some of our professional training institutions, the curriculum is so idealistic that graduates are not prepared to promote satisfactory programs in localities having inadequate facilities and in the communities unfamiliar with modern physical education. The person responsible for teacher training must be very alert to actual conditions in the field. He can hardly assume the attitude that his professional curriculum is right regardless of its utility to the public schools of the state, and regardless of the conditions found in these schools. It is understood, however, that any forward-looking professional curriculum also provides the student with an appreciation and vision for improved and more ideal conditions than may be found in some of our communities.

If teacher training is to prepare students for the realities of today, as well as the realities of the future, a knowledge of the present status of physical education in public schools is a necessity. A survey of facilities,

[7] H. A. Scott, "Essentials of Teacher Training," *The Journal of Health and Physical Education*, Vol I, No. 4 (April, 1930), page 10.

personnel, program, teaching, and the other important phases of physical education programs in the field is the initial step in practicalizing our professional curriculum.

The director of professional preparation again wishes to make an inquiry. He says, "Such a survey will not give us information as to the weaknesses and strengths of our teacher-training program. If we knew this we could really improve our curriculum."

This type of information might very well be secured as a part of the survey mentioned above. It might very well consist of the questionnaire, supplemented by the conference and interview techniques. Through the use of these three tools the director could ascertain those units of the curriculum which had failed to be functional to his students in the field, and those units which proved to be most valuable to them. It should be especially interesting to note the differences and similarities in the opinions of those who had been in the field for several years and those who were in their first year of teaching or coaching.

"This may all prove to be true," the director of teacher training replies, "but how can we improve our curriculum and teaching so that we offer courses which will prepare students for the different types of positions? Surely a student with research abilities should receive a different kind of training from that given the student whose forte is in activities."

It is assumed that refinement and specialization in training, at the present time, seem best allocated to graduate study.[8] Job-analyses[9] of the various kinds of positions would furnish data indicative of the proper scope and intensity of the various graduate courses.

One of the best antidotes for the director of the professional training in physical education who may be suffering from complacency is to consider the results of a survey of equipment, program, teaching, and the personnel of his own department. Even an honest self-survey[10] conducted by the department's staff members would indicate many ways of improving the department. A survey conducted by an outside agency, such as the Institute of Educational Research, Teachers College, Columbia University, undoubtedly would point out conditions which had escaped notice for years. The recommendations and suggested ways for improvement should prove to be as helpful to teacher-training departments as they have been to the public schools.[11]

The head of professional training now presents this question: "After our department is surveyed, and after all of these other surveys have been conducted, how do we know that our professional curriculum is actually satisfactory? Are we certain that any single one of the ten thous-

[8] H. A. Scott, *op. cit.*, page 67.

[9] N. P. Neilson, "Job-Analysis Technique Should be Applied to Physical Education," *The Journal of Health and Physical Education*, Vol I, No. 1, (January, 1930).

[10] W. H. Allen and C. G. Pearse, *Self-Surveys by Teacher-Training Schools*, Yonkers-on-Hudson, New York: World Book Company, 1917.

[11] H. L. Caswell, *City School Surveys*, New York: Bureau of Publications, Teachers College, Columbia University. 1929, pages 54-80.

and special teachers in physical education in the United States was ever exposed to a professional curriculum which gave optimum returns?"

The professional curricula in physical education are aspects of our institutions and expressions of our social attitudes and ideas. "The complexity of the present order makes it evident that intuition and metaphysical idealism, combined with best intentions, is quite inadequate to the task of guiding (any type of) social reconstruction. Only the social sciences made ever more scientific and inductive can be looked upon as sufficient to preside over this problem."[12]

It was suggested at a recent gathering of two of our National Societies[13] that the improvement of the program of professional preparation of physical education teachers should come about as a result of a rating or classification of the professional departments or schools by an outside agency. The possibilities of such a classification of teacher-training departments are appreciated. However, is not this plan a second rather than a first step? Is not the first step in upgrading and improvement the careful analysis and appraisal of *all* teacher preparation in physical education? At the present time the North Central Association of Secondary Schools and Colleges is in the midst of a five-year study, the purpose of which is to revise the standards which have been used as a basis for the accreditment of higher institutions.[14] That is, the very bases for accreditment are being questioned. It is said that they have proved unsatisfactory.

Do we in physical education wish to set up standards for the classification of our professional schools before we can agree upon what type of professional training is best? Do we wish to classify our teacher-training departments according to certain standards, only to discover after reflection that the very standards themselves are faulty? It appears that the rating of departments of physical education at this time is only a *half measure* and merely aimed at institutions which we believe have inadequate programs of professional training. The full measure would be a study aimed at *all* curricula of the professional training of physical education teachers. We may then discover some of the basic elements in the best type of professional preparation. Rating and classification might then follow. It is understood that our ideas of what constitutes the best type of professional curriculum will change along with our other standards of what is good in life. It is also understood that any real survey of professional preparation involves considerably more than catalogue studies and other such superficial measures.

There is need, therefore, for bolder thinking and planning in our professional curricula. Custom and tradition furnish us with many rationalizations for the failure to attempt extensive experimentation. Custom and

[12] Jerome Davis and H. E. Barnes, *Readings in Sociology*, Boston, Mass.: D. C. Heath & Company, 1927, page 12.

[13] The Society of Directors of Physical Education in Colleges and Universities, and The Society of State Directors of Physical Education, (New York, Dec. 28, 1931).

[14] H. P. Rainey, "Activities of the Commission on Institutions of Higher Education," *The North Central Association Quarterly*, Vol VI, No. 1, (June, 1931) page 8.

convention continually ask that our curriculum problems be solved by an application of the "wisdom of our forefathers," rather than by an application of the scientific method.

The point is not being made that the scientific method should make slaves or worshippers of us. The scientific method is not a mysterious something. We use it every day. It has been used by people for hundreds of years. Whenever we substitute definite ways of solving a problem for taking the solutions for granted, relying on authority, or making irresponsible assertions about it, we are using the scientific method. Stated in another way, the scientific method arises from such attitudes as being curious, careful, objective, and alert.

One of the reasons often given for including chemistry, for example, in our professional curriculum is that it develops a scientific attitude and a scientific technique in handling problems in life. If common observation is a reliable guide, scientific training in chemistry is usually unrelated to social behavior, at least outside of the laboratory. Students trained in the traditional fashions of the chemical laboratory may demonstrate beyond any reasonable doubt that they have mastered the scientific method—in chemistry. Yet these same students have never demonstrated any unusual application of the scientific method in religion, economics, or the other phases of life closely related to social interplay.

As a matter of fact, the question may be asked, "Why teach those traditional aspects of chemistry content which are unrelated to physical education?" Are there those who believe we should teach it for disciplinary purposes? Should traditional types of chemistry be taught for cultural reasons? Do physical education students need more cultural values from chemistry as it is applied to a broad interpretation of physical education?

Helping major students to see pertinent applications of chemistry, for example, has not been considered a serious enough problem to stimulate most of us to do very much about it. Our procedure along this line has been little better than "wishful thinking." We do not know when, how, or to what degree such a subject is "functional." Furthermore, we have only a notion of the precise aspects of chemistry which are ever recognized by students as practical or pertinent. Both the chemistry, and physical education teachers fail to generalize chemistry *enough.*

If we add experimentation to the other techniques used in surveying the content and teaching of the professional curriculum, progress in improving professional training may be expected and accelerated. Experimentation in the content and teaching of curricula is considered by some to be a hazardous undertaking. Yet Chicago, Rollins, Wisconsin, Teachers College at Columbia University, and other institutions already are launched into the venture. Shall we follow this leadership, or is our present curriculum and teaching merely "good enough"?

PLACEMENT, AND IN-SERVICE FOLLOW-UP

The final problem is dual in character, including the placement of graduates in positions and the subsequent in-service follow-up. The relative supply and demand of physical education teachers, the development and maintenance of desirable professional attitudes—in fact, the very reputation of the teacher-training department depends, in part, upon the solution of this two-phased problem.

This paper has suggested that the information and data resulting from the personal surveys of major students are valuable in solving problems related to the selection of students, and are useful in determining whether or not students should be permitted to continue after a year or two of probation. These data are also useful in a third way, namely, in the placement of students. The head of teacher training should be extremely alert to any and all information which will assist him in understanding his students better. Placement thus becomes a process based upon a wide range of facts and information.

A second set of facts necessary for intelligent placement relates to the position itself. The point has been made that each department of teacher training should have a record of the results of the surveys of physical education programs in the public schools of the state. We have seen that this information is useful in indicating the physical education backgrounds of prospective students. It is also valuable to professional training departments because students may become familiar with what to expect in the field, and instructors may modify their teaching terms of realities. This information is vital for a third reason—the placement of teachers. If the person in charge of teacher preparation has at his disposal the survey reports of the various physical education programs in the public schools of the state, he may easily acquaint himself with the pertinent conditions and factors in the various positions throughout the state.

The results of personal surveys of the major students and the surveys of the physical education programs are of further value. They may be used in the in-service follow-up of the graduates who are teaching. One of the major responsibilities of the field representative who is in charge of in-service follow-up is materially simplified if he has the facts regarding both the individual and the position. His suggestions, therefore, are at once applicable and practical. They are made with due consideration to a given teacher, with his peculiarities and abilities; and with special reference to a specific position, with its handicaps and advantages.

The survey is also an indispensable tool to the field representative in the execution of such tasks as checking on the functional values of the various units of the professional curriculum to those in-service, and in keeping the teacher-training department's records up-to-date regarding pertinent conditions in the field.

The general recognition of the survey as an appropriate tool to be used in a study of professional preparation is evidenced by the National

Survey of the Education of Teachers which is taking place at the present time. This survey is a nation-wide study of the professional preparation of teachers in public schools. It has the backing of such professional groups as the American Association of Teachers Colleges, the Council of State Superintendents of Education, the Association of Deans of Education, and the United States Office of Education.

THE QUESTION OF ADJUSTMENT

A physical educator in charge of professional training recently asked this question: "Suppose we conduct the surveys which have been suggested and suppose the results point to abrupt changes in the way we are doing things in our department, do you believe that we should make these changes?"

In these days of modern education and modern physical education we are often admonished to be alert to change, to be willing and eager to change, and to be cognizant of this ever-changing world. It does seem to be true that no sooner are our plans constructed than they must be changed again. Most of us are reminded many times of the vacillating nature of physical education when it is compared with some of the long-established academic subjects. In our zeal to be sensitive and responsive to change, to be progressive, alert, and in full possession of an open mind, it is well to consider the fact that the mind which remains open too long and too often, sometimes becomes a little *draughty!*[15]

In the literature, one sometimes finds the survey roundly criticized. There is sufficient evidence to justify some of the criticisms which have been leveled at surveys. However, it is not always the *tool* which is faulty —sometimes it is the way the tool is *used;* sometimes the tool is used on the *wrong material*—and occasionally the results of the application of the tool are *misinterpreted.*

Until we find a method which produces better results in a more effective manner—and it is highly probable that we shall, for there are always better ways of doing things—we who are interested in the improvement of professional preparation for physical education teachers may consider the survey and its contributory techniques as a method worthy of consideration. It seems clear that *some* type of scientific method is better than *no* scientific method at all.

[15]Adapted from an unpublished lecture by Prof. Henry Suzzalo, Teachers College, Columbia University, 1930.

A Study in the Use of Knowledge and Skill Tests in Soccer[1]

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THE FIELD of testing in the physical education program today clearly demonstrates the fact that a "man's reach invariably exceeds his grasp." However it presents a real challenge. We believe with McCall[2] that "to the extent that any goal of education is intangible, it is worthless." The values of measurement must be realized if we wish to establish ourselves on a sound educational basis. Our marking system has always been in a chaotic state. Continually, the teacher of physical education is called upon to explain her subjective opinion called a school mark. Whether disastrous or no, school marks seem to have become synonymous with goals in education. At any rate, pupils are still working for marks. Competition is part of our national texture today and we cannot fail to recognize this factor in our educational practices. Teachers must be able to produce, for the individual, proof of his accomplishment during an instructional period. It is here that valid and reliable measures should be effective in substantiating a teacher's judgment. "Physical Education is an integral part of the school curriculum. Achievement in its activities should be judged and graded in the same manner as it is in an academic subject."[3]

From the general teaching standpoint we have proof that a well planned testing program not only assists the superior teacher to grow, but that it helps to measure the efficiency of all teaching.

A general survey of the field of achievement tests in physical education combined with the knowledge that "progress from now on will not be seen in long strides, but in small details of improvement in teaching,"[4] led us to limit ourselves to one area of testing, namely, that of knowledge and skill tests in the game of soccer.

STATEMENT OF THE PROBLEM

I. What is the procedure in the construction of a test to measure the skills essential in playing the game of soccer at this age-grade level?

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[1] Experiment carried on in Grades V and VI of the Elementary Schools under the auspices of the writers as Supervisors of Physical Education in the Public Schools of Royal Oak, Michigan, and Austin, Texas, respectively.

[2] W. A. McCall, *How to Measure in Education*, p. 11.

[3] J. F. Williams and C. L. Brownell, *Health and Physical Education for Public School Administrators. Secondary Schools.* p. 101.

[4] M. B. Hillegas, Class Lecture, Education s233A, Supervision of Instruction in the Elementary School, Teachers College, Columbia University, July 1930.

A. How will the test items be selected?
B. How may the validity of such test items be determined?
C. How may the reliability of these test items be established?
D. Upon what bases will the final battery of skill tests be selected?
E. How may battery reliability be determined?

II. What will be the process in the construction of a knowledge test which will be a valid, reliable measure of the rules and maneuvers of the game of soccer at this age-grade level?

III. Is there any correlation between the battery of soccer skill tests and the soccer knowledge test used in this study?

CONTRIBUTING PROBLEMS

The fact that we have, at present, no valid measure of motor ability for boys of these ages, limits this investigation in that it is not possible to determine the average rate of improvement in soccer skills for either individuals or for groups. However, we hope that the results of this study will prove contributing factors when such motor ability tests are constructed.

Another assumption applies to a test of general athletic ability for boys. Would not the logical plan be to use as one part of a battery of skill tests for measuring general athletic ability, that test item from the battery of soccer skill tests which correlates most highly with judged success in playing the game of soccer?

SOURCES AND METHODS OF SECURING THE DATA

In this particular study, skill and knowledge tests for the game of soccer were constructed and given to boys in the fifth and sixth grades of the public schools in the cities of Royal Oak, Michigan, and Austin, Texas. These tests were developed and administered, not in a control experimental group, but in an actual teaching situation. Skill and knowledge tests were both used because it was believed that a significant relationship between these two types of tests would be an administrative asset. Likewise, there seemed to be a possibility that skill and knowledge are interdependent in playing a good game. Carry-over value of a sport appeared doubtful if an individual possessed no knowledge of game situations and plays. An Initial Test (I T) was given to all boys in the fifth and sixth grades at the beginning of the fall soccer season, followed at the close of the season by an achievement or Final Test (F T).

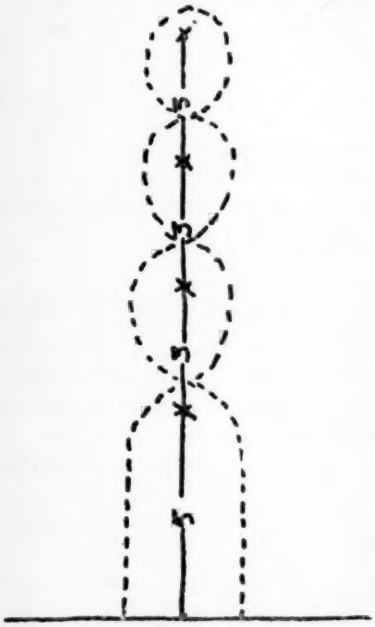
The battery of skill tests and the knowledge tests have been used in the above two cities over a period of three years and have undergone constant revision. During the past two years the tests have been given to a total of 1420 fifth grade boys (average age 10.9) and to 1277 sixth grade boys (average age 11.8).

These tests were given during the physical education class periods as part of the instructional program. Administration of the tests is discussed in detail in the following sections. In every instance effort has been made

to secure objective and reliable results by preparing detailed and uniform directions for giving and scoring the tests.

STANDARD DIRECTIONS FOR THE SKILL TESTS

In this test the five-yard line gives the player a chance to start his dribble unobstructed. Chairs were used as obstacles to secure greater uniformity. They were so placed in this test in order to preserve, as nearly as possible, the game situation. After preliminary testing it was found better to take the time at the finish when the *player* crosses the line *with* the ball and not when player or ball alone cross the line. This eliminates the player's desire to run across the finish line having kicked, not dribbled, the ball across the finish line as soon as he rounded the last obstacle.



1. Soccer Dribble Test—

Equipment.—Well inflated soccer ball, stop watch, four kindergarten chairs, the lower rung of which is low enough so that it will not allow the ball to roll under. Draw a starting line, and five yards from this starting line place the first chair. Place the three other chairs three yards apart, so that all obstacles are perpendicular to the starting line.

The Test.—Player starts at starting line and dribbles the ball in and around the four chairs and back again, recrossing the starting line. Be sure the player actually dribbles the ball. The player must recross the starting line with the ball.

Score.—Time is taken from the instant the ball is first kicked until the instant the player, with the ball, recrosses the line. A stop watch *must* be used for taking time in seconds and fractions of seconds, which constitutes the actual score.

In this test item, as well as all others, we attempted to adhere to the game situation. Here the throw-in is taken as from touch. The two-foot and four-foot targets on the ground are the result of experimentation with one target only, which limited performance at the high end of the scale. With two concentric targets, the range of scores approximated a normal distribution and hence gave opportunity for all abilities to score above zero, as well as adequately testing those who would score at the high end of the scale. The six-yard distance from the touch line, plus the diameter of the larger target, approximates the distance set-up in a game situation where the player taking the throw-in must accurately place a ball in relation to a player receiving.

2. Throw In—

Equipment—well inflated soccer ball. Draw on the ground a target the center point of which is six yards from a touch line. This target is to be two feet in diameter. Using the same center point construct around this first target another circle four feet in diameter.

The Test—The form used in this test is the same as that used in the throw-in in a soccer game. Player stands, with feet together, behind the touch line, and throws the ball, by an overhead throw, at the target on the ground. He is allowed ten trials.

Score—Score two points if the ball hits within the inner target. Score one point if the ball hits on the line of the inner circle or hits within the outer circle. If the ball hits on the line of the outer circle the score is zero.

3. Kicking Goals, the place kick—

Equipment.—Well inflated soccer ball. Soccer goal area eighteen feet wide, divided into three sections. The two sections nearer the goal posts are each five feet wide, and the center section eight feet wide. Establish the penalty-kick mark twelve yards from the center of the goal area.

The Test.—Player places the ball on the penalty-kick mark and is given ten trials to kick the ball through the goal. Goal is not guarded by the goalkeeper.

Score.—Score two points for each goal kicked where the ball passes through the outer section of the goal area. Score one point for a goal kicked where the ball passes through the center section of the goal. The player is credited if he kicks a ball which hits the goal post and rebounds through the goal.

The distances in this test are controlled by soccer playing regulations. In preliminary tests the goal was not divided. However, a ball passing between the goal posts, under the bar, and just skimming the goal posts is considered much more difficult for the defense to guard; hence, two points are awarded for a successful kick through the outer sections, with one point awarded for a kick through the center section. An undivided goal line showed a preponderance of perfect scores, and sectioning was necessary to approximate a normal distribution of scores. This is a distance kick with the objective of accuracy of placement. It is taken from a definite game situation. The goal is left unguarded because this test is fundamentally a test of accuracy in kicking a goal, rather than a test of defense play.

4. Kicking Goals, kicking a rolling ball—

Equipment.—Soccer ball, well inflated. Well outlined goal and penalty areas, according to regulation soccer rules.

The Test.—Instructor rolls the ball from the corner of the goal area on the end line. The ball is rolled diagonally across the goal area. Player stands at diagonally opposite corner of the penalty area. As the instructor rolls the ball, with fairly good

speed, the player taking the test comes in on the ball and attempts to kick it before entering the goal area. His object is to make a goal. The instructor rolls the ball five times from the right, and five times from the left corner of the goal area, at its point of intersection with the goal line. The ball which the instructor rolls must be moving with good average speed as it crosses the goal area.

Score.—Score two points for a successful kick through the goal. Score one point for each ball which does not go through the goal, but crosses the end line within the limits of the goal area. The ball must be kicked by the player taking the test before he reaches the boundaries of the goal area.

There is quite general agreement, from a coaching point of view, in regard to clearing the goal in soccer, that is, clearing to the outside is preferable, hence, it will prove a desirable ability for a player to be able to execute a speedy, accurate, diagonal return of such a ball. The effect of the personal equation in this test was held more constant by using one person (usually the instructor) to roll the ball throughout the administering of the test. It was deemed advisable to give credit for a kick which, though it did not result in a goal, passed over the end line within the limits of the goal area. This proved a motivating feature for those of low ability, and since greater accuracy was rewarded by more points, the aforementioned plan set the stage for potential growth in the more difficult skill of actually kicking a goal.

THE KNOWLEDGE TEST

The knowledge test consists of one hundred false and true statements on game rules and playing maneuvers. We assume that there is sufficient agreement among teachers of physical education as to the level of game strategy pertinent at this age grade period, so that it has been included in the knowledge test. A more detailed plan of construction and administration of the test will be found in a later section.

SELECTION OF TEST ELEMENTS

"Tests are more comparable to life results the more nearly they approach the character of the life process"[5] so in order to determine a representative sampling of worthwhile techniques from the game of soccer:

a. We had the teachers[6] of physical education in Austin, Texas, and Royal Oak, Michigan, analyze the skills of soccer playing ability. We accepted the rating of their combined judgments;

b. We noted elements of the game of soccer which children practice by themselves, and which they, undirected, put into simple improvised games;

c. We experimented in preliminary tests with skills chosen by known workers in this field[7];

[5] W. A. McCall, *op. cit.*, p. 196.
[6] A total of twenty-five judgments.
[7] D. K. Brace, *Measuring Motor Ability*, p. 81.
L. Andersen, *An Athletic Program for Elementary Schools*, Chapter XI.
M. Hillas and M. Knighton, *An Athletic Program for High School and College Women*, p. 22.
Official Soccer Guide, Women's Athletic Editorial Committee (1931-32) p. 39.

d. We surveyed courses of study in physical education, analyzed activity programs, and made a composite of these requirements in the teaching of skills.

In evaluating a test the chief criterion is validity, that is, the adequacy and detail with which the test measures the trait, function, or school subject that it purports to measure. Symonds[8] says that in constructing achievement tests, most of the validation of the test items must be accomplished by means of choice of material suitable for the test.

A difference of opinion exists concerning the principles which underlie the choice of material, but the following six criteria may be used with safety. Four of these were used by the writers in this study.

a. "Criterion of extrinsic use.
b. "Criterion of errors.
c. "Composite of textbooks.
d. "Composite of requirements in course of study.
e. "Composite of teachers' examinations.
f. "Judgment of experts."[9]

Bovard and Cozens[10] cite the following means of establishing validity of a test:

a. "Analysis of the content of courses of study.
b. "Combined judgments of experts in the field.
c. "Correlation with measures of success of the ability in question.
d. "Increase of accomplishment with successive ages.
e. "Correlation with previously validated tests.
f. "Social usefulness.
g. "Combination of several of the above."

In order to determine how well the test items measure what they purport to measure, that is, soccer playing ability, we must have some criterion of such playing ability, and in this instance, judged success in that ability was used as the anchor. Two measures of success were used in this study:

a. Combined judgments of teacher and squad leader rating the same individual on ability in soccer; and
b. Success in making school and intramural teams.

VALIDITY OF THE SKILL TESTS AS MEASURES OF SOCCER PLAYING ABILITY

Players were ranked in order of merit in soccer playing ability. Thus the best player was placed at the top of the list and the poorest player was placed at the bottom of the list. All boys in Grade V were ranked in one list, and all boys in Grade VI were ranked in another. Judgments were made according to the following standards:

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[8] P. M. Symonds, *Measurement in Secondary Education*, p. 280.
[9] *Ibid.*, p. 280.
[10] J. F. Bovard and F. W. Cozens, *Tests and Measurements in Physical Education*, p. 241.

CRITERIA FOR JUDGING SOCCER PLAYING ABILITY

INSTRUCTIONS TO TEACHERS: Rank your pupils, by grades, in order of merit, keeping in mind the following criteria and their varying progressions. Place the *best* player at the top of the list and the *poorest* player at the bottom of the list.

Maximal				Minimal
Made school team in soccer	Showed promise of making school team in soccer	Made class team in soccer	Had possibilities of making class team in soccer	Did not make any team
Demonstrated superior ability in executing game maneuvers in soccer	Demonstrated above average ability in executing game maneuvers in soccer	Showed average ability in executing game maneuvers in soccer	Demonstrated fair ability in game maneuvers in soccer	Showed little ability to execute game maneuvers in soccer
Played very intelligently with others in the game situation	Co-operated with others in team play	Co-operated in team play most of the time	Desired the ball for individual plays	Does not recognize power of group effort; weak in ability to play with group
Knew and always used excellent technique in handling the ball	Knew and used, most of the time, good technique in handling the ball	Knew good techniques, but made only fair use of them	Knew, but did not use game technique; lost his head in desire for individual play	Did not learn to use game techniques in a game

According to a method described by Hull[11] the order-of-merit rankings made by the teachers of physical education and squad leaders were transposed to a linear scale. This procedure was necessary in order that these rankings might be used in further computations. Hull's method presupposes that the ability in question is distributed according to the Gaussian Law. The per cent of cases falling between successive points on the scale is determined by Sheppard's Tables.[12] Further, Hull's method provides for the computation of r by the Pearson Product-Moment Method from ranked data.

Correlations were then run by the Pearson Product-Moment method[13] between the single test elements and the judgment ratings of soccer playing ability, now in linear form (see Table V), and also between the Composite Score on the battery of skill tests and the judgment rating of soccer playing ability. In grade V the correlation between the composite T score of the soccer skill test and the judgment rating was $+.602 \pm .0305$. In grade VI the relationship between the composite T score and judged playing ability was $+.624 \pm .0305$ (see Table I). According to Rugg[14] these may be regarded as high correlations.

A second means of validating the skill test is by demonstrating a consistent increase in percentage of successes with successive grade lev-

[11] Clark Hull, "Computation of Pearson r from Ranked Data," *Journal of Applied Psychology VI* (1922) 385-390.
[12] Karl Pearson, *Tables for Statisticians and Biometricians*, pp. 2-8.
[13] H. E. Garrett, *Statistics in Psychology and Education*, p. 163 ff.
[14] H. O. Rugg, *Statistical Methods Applied to Education*, p. 84.

TABLE I

CORRELATION OF COMPOSITE T SCORES ON SOCCER SKILL TESTS WITH JUDGMENT RATING OF SOCCER PLAYING ABILITY OF BOYS IN GRADES V AND VI, 1930–31

Grade	Number of Cases	Correlation	Probable Error
V	227	.602	.0305
VI	204	.624	.0305

"A product-moment correlation coefficient of .60 or above for this type of data may be regarded as a high coefficient."[14]

els.[15] The mean composite score on the initial test in grade V was found to be 182.451, and in grade VI, 188.490. On the final test in grade V the mean composite T score was found to be 207.069, and in grade VI, 215.-638. The reader is referred to Table II.

Further means of validation of the skill test is shown by a comparison of the mean scores of an average unselected group of fifth grade boys and those fifth grade boys who made the school team; also a comparison of the mean scores of an average unselected group of sixth grade boys and those who made the school team. The mean composite T score of unselected fifth grade boys on the soccer skill test was found to be (initial test) 182.451, and for team members 196.17. On the final test the mean composite T score of unselected fifth grade boys on the soccer skill test was found to be 207.069, and for team members 225.17. In grade six, the mean composite T score of the unselected group of boys was found to be 188.490, and for team members 201.790 on the initial test. On the final test, the mean composite T score of unselected sixth grade boys was

TABLE II

DIFFERENCE OF TWO MEANS ON SOCCER SKILL TEST; A. UNSELECTED GROUPS AT SUCCESSIVE GRADE LEVELS, B. UNSELECTED GROUPS AND TEAM MEMBERS, OF BOYS GRADES V AND VI, 1930-31.

	Group	Grade	Mean Composite Score I T	Mean Composite Score F T	Difference Two Means	$\frac{D}{\sigma \text{ diff}}$
A	Unselected	VI	188.490		6.039	3.019
	Unselected	V	182.451			
	Unselected	VI		213.638	8.569	4.76
	Unselected	V		207.069		
B	Team Members	V	196.17		13.719	5.08
	Unselected	V	182.451			
	Team Members	V		225.17	18.101	7.21
	Unselected	V		207.069		
	Team Members	VI	201.79		13.30	4.48
	Unselected	VI	188.490			
	Team Members	VI		223.156	7.518	3.38
	Unselected	VI		215.638		

"It is usually customary to take a $\frac{D}{\sigma \text{ diff}}$ of 3 as indicative of complete reliability. A $\frac{D}{\sigma \text{ diff}}$ greater than 3 is taken as indicating just so much added reliability."[16]

[15] G. M. Ruch and G. D. Stoddard, *Tests and Measurements in High School Instruction*, p. 45; pp. 319 ff.

[16] H. E. Garrett, *op. cit.*, p. 133.

found to be 215.638, and for team members 223.156. The reader is referred to Table II for evidence of the reliability of the difference of these means. Computations show a reliable difference of two means on the individual test items for both initial and final tests, of unselected groups and team members, at successive grade levels, but space does not allow inclusion of this data.

RELIABILITY OF THE SKILL TEST

I. RELIABILITY OF TEST ITEMS

"A test is reliable when it measures accurately, that is, when applications of equivalent forms yield scores that are practically identical."[17]

The items of the skill test in soccer were given to all boys in the fifth and sixth grades at the beginning of the fall soccer season. This test, called the Initial Test (herein referred to as I T), was given previous to any definite practice in the game of soccer. At the close of the season all fifth and sixth grade boys were given the same test again. This test is called the Final Test (herein referred to as F. T). This was done in order to determine the reliability of the test items and to show achievement in game skills during the playing season.

Reliability is increased if adequately standardized directions for administering the test are used. The mimeographed descriptions of the tests, with plans for administering, group organization, and plans for standard uniform equipment, were placed in the hands of all teachers giving the tests. The entire process was also demonstrated to the teachers of physical education who gave the tests. Squad leaders helped with field lay-out, acted as scorers and judges, and, in many cases, manipulated the stop watch for the dribble test. Squad leaders were given definite training in the use of mimeographed squad score sheets, reports, scoring sheets, and were cautioned regarding their responsibility for accuracy in scoring. This has been deemed an invaluable laboratory experience in leadership training. It is essential that all participants be impressed with the necessity for uniformity of procedure and careful following of printed directions.

It is true that practice on a test and growth in the trait tested should not markedly influence the reliability coefficient, but the range of ages, size of the group tested, the personal equation of pupils scoring, varied skill of examiners, and differences in teaching ability during an instructional period, cannot help but influence to some extent a coefficient of self correlation.[18]

Tables III and IV give the Coefficient of Reliability of the soccer skill test items, and the composite T score on the soccer skill test. In grade V the self correlation on the dribble test was $+.626 \pm .0249$; on the throw in $+.643 \pm .0249$; on the place kick for goal $+.625 \pm .0272$; and kicking a rolling ball through the goal $+.625 \pm .0272$. In grade VI the self cor-

[17] P. M. Symonds, *op. cit.*, p. 287.
[18] G. M. Ruch and G. D. Stoddard, *op. cit.*, p. 56.

relation on the dribble test was +.68 ±.027; on the throw in +.69 ±.0218; on the place kick for goal +.601 ±.0358; and kicking a rolling ball through the goal +.67 ±.0275. In grade V the coefficient of reliability of the composite T score was +.715 ±.0218, and in grade VI, +.741 ±.0243. Ruch and Stoddard[18] contend that for group measurement purposes a reliability coefficient of +.50, when determined from one grade range of talent, may be sufficiently high, depending upon the examiner's purpose. According to McCall[19] " a class score for a class of ordinary size will be sufficiently reliable for most purposes, even though the test self-correlation is as low as .55. But if the test scores are to be used to make important judgments concerning individual pupils the self correlation should be above .9. Scores for individual pupils have some value when the self correlation falls considerably below .9."

TABLE III

COEFFICIENT OF RELIABILITY OF THE SOCCER SKILL TEST ITEMS, GRADES V AND VI, 1930-31

Test Items	r	P.E.	Index of Reliability*	Number Cases	Grade	Age
Dribble	.626	.024	.79	318	V	9-13
Throw In	.643	.024	.80	293	V	9-13
Place Kick for Goal	.625	.027	.79	261	V	9-13
Kicking Rolling Ball	.625	.027	.79	252	V	9-13
Dribble	.68	.027	.80	260	VI	10-14
Throw In	.69	.021	.803	255	VI	10-14
Place Kick for Goal	.601	.035	.77	223	VI	10-14
Kicking Rolling Ball	.67	.027	.801	210	VI	10-14

*"The maximum of reliability which the test (in its present form) is capable of yielding."[20]

TABLE IV

COEFFICIENT OF RELIABILITY OF THE COMPOSITE SCORES ON THE SOCCER SKILL TESTS, GRADES V AND VI, 1930-31

Grade	r	P.E.	Index of Reliability*	Number Cases	Age
V	.715	.0218	.84	241	9-13
VI	.741	.0243	.86	193	10-14

*"The maximum reliability which the test (in its present form) is capable of yielding."[20]

II. RELIABILITY OF THE BATTERY

"Where several tests are to be combined into a battery there must be considered, not only the correlation of each test with the criterion, but also the correlation of each test with the other tests. This fact is embodied in the useful, though inexact, maxim which states that the correlation

[19] W. A. McCall, *op. cit.*, p. 310.
[20] H. E. Garrett, *op. cit.*, p. 273.

between tests and the criterion score should be as large as possible, whereas, the correlations among tests should be as small as possible."[21] Referring to Table V it is evident that the intercorrelations on the soccer skill test items are low, and the correlation of the skill test items with the criterion (judged soccer playing ability), though not high, is significant. (The reader is referred also to Table I.)

TABLE V

INTERCORRELATIONS OF THE FINAL BATTERY OF SOCCER SKILL TESTS, GRADE VI, 1930–31

Test Variable	Intercorrelations of				Self r	r with criterion
	Dribble	Throw in	Place Kick for Goal	Kick Roll. B'l for G'l		
Dribble		.264	.036	.08	.68	.47
		.0529	.0551	.0477	.0272	.0401
Throw In	.264		.041	.092	.69	.661
	.0529		.0477	.0542	.0218	.0275
Place Kick for Goal	.036	.041		.229	.601	.48
	.0551	.0477		.0458	.0358	.0401
Kicking Rolling Ball for Goal	.08	.092	.229		.67	.48
	.0477	.054	.0458		.0275	.0358

The battery reliability was determined by use of a formula by Kelly[22] for correlation between sums of a series of tests not strictly comparable. By this method the battery reliability was found to be $+.801 \pm .0172$. This is higher than the average reliability coefficient of the various items in the battery, and indicates that the length of the battery as against single test items increases reliability.

It will be noted that the battery as a whole shows greater reliability than any of its single test elements. Battery reliability was also determined by correlating composite T scores on the I T soccer skill test with composite T scores of the F T soccer skill test. In grade V, correlation of the composite T scores on the I T and composite T scores on the F T soccer skill test was $+ .715 \pm .0218$; and in grade VI the correlation of composite T scores on I T and F T was $+.741 \pm .0243$ (See Table IV).

III. RELIABILITY OF THE KNOWLEDGE TEST

The soccer knowledge test has been in process of construction over a period of three years. In its beginning three types of objective tests were used, namely, completion, multiple choice, and true-false. The former two types were eliminated following experimentation with boys in these two grades. In addition, these two types of tests were more difficult to score than the false-true test, so that the present knowledge test consists of one hundred true-false statements concerning game situations and the playing regulations of soccer.

Reliability of this test was increased by eliminating such mechanical

[21] C. L. Hull, *Aptitude Testing*, p. 449.
[22] T. L. Kelly, *Statistical Methods*, p. 198, formula 148.

defects as catch questions, faulty choice of words, poor sentence structure, and by studying the vocabulary ranges of pupils in grades V and VI, by standardizing directions for both teacher and pupils, by giving a preliminary sample of the test. The method of scoring was Rights minus Wrongs. Teachers were given perforated oak tag scoring keys to facilitate easy and accurate scoring. In order that fatigue not enter the situation, teachers were instructed and tests were so constructed that pupils could take half of the knowledge test at one sitting and half at another.

In the process of revision frequency distributions of question difficulty and statements most often missed were compiled. On the basis of this data statements were restated, ambiguities eliminated, and instructions simplified and made more uniform. The procedure followed is that suggested by Russell in his book *Classroom Tests*.[23]

No reliable criterion was available for determining the reliability of the knowledge test, other than the test itself. In determination of reliability of the knowledge test the results of its 1930 revision are herein reported. The 100 false-true statements were broken up into chance halves and the scores made on the odd numbered statements correlated with the scores made on the even numbered statements.

The coefficient of reliability of the soccer knowledge test, determined by Spearman's[24] formula was found to be $+.903 \pm .0181$. This formula was used on the assumption that both halves of the test, as constructed by the writers, are approximately equivalent in difficulty and content.

The soccer knowledge test was regarded as valid because "in constructing achievement tests, most of the validation of the test items must be accomplished by means of choice of material suitable for the test."[25] In addition, the difference of two means, grades V and VI, was found to be 8.08, which may be regarded as highly reliable.

RELATIONSHIP OF THE SOCCER KNOWLEDGE AND SKILL TESTS

A hypothetical premise of relationship between ability in soccer game skills and knowledge of the game, as tested by the instruments employed in this study, was only insignificantly corroborated. A low, though positive, relationship between scores on the soccer skill test and the knowledge test was found (see Table VI). Correction for attenuation resulted in grade VI, of a positive $r+.192 \pm .0472$; and in grade V, a positive r of $+.12 \pm .047$.

TABLE VI

CORRELATION OF SCORES ON THE SOCCER SKILL AND KNOWLEDGE TESTS, GRADES V AND VI, 1930-31

Grade	Test	Correlation	P.E.	Number	Age Range
V	IT	.102	.047	230	9-13
V	FT	.094	.042	228	9-13
VI	IT	.16	.0472	201	10-14
VI	FT	.133	.0472	201	10-14

[23] Charles Russell, *Classroom Tests*, Chapters 11 and 12.
[24] H. E. Garrett, *op. cit.*, p. 271.
[25] P. M. Symonds, *op. cit.*, p. 280.

SCALING THE TESTS

McCall[26] states the following criterion on the scaling of tests: "the test should be so scaled that units of measurement will be equal at all points on the scale and the method of combining units will be simple and appropriate." In order that McCall's criterion, as stated above, be satisfied, and in order that a composite score of the battery of soccer skill tests might be computed, and, in order that the scores on the separate test items might be in comparable units, the raw scores on each item of the skill test were transposed into T scores, according to McCall's[27] T scale method. Furthermore, this procedure was necessitated by the fact that the raw scores on the dribble test were recorded in "seconds and fractions of seconds" of time, and the raw scores on the other skill test items were recorded in "points."

In constructing the T scale the distributions on the I T and F T were combined in order that the highest and lowest scores be scaled, and—"*all* scores for *all* pupils can be converted into equivalent T scores"—[28]. Scores of all pupils (grade V, number cases 907, grade VI, number cases 731) were used in scaling the test, but computations were based on selected schools (grade V, N = 227, grade VI, N = 204)[29] in order to rule out constant irrelevant factors[30] (such as inexperience of examiners) which would markedly influence the results.

Tables VII and VIII are the tables for converting raw skill test scores into T scores. Separate scales are given for grades 5 and 6.

Scores on the soccer knowledge test were, likewise, converted into T scores according to the aforementioned method of McCall. Scores were converted into T units to permit comparison with scores on the soccer skill test. Table IX is the table for converting the soccer knowledge test (raw) scores into scale scores.

INTERPRETATION OF DATA

1. It is evident from the data in the previous sections that the soccer tests as constructed are valid and reliable instruments for group measurement of the skills and certain knowledges of the game of soccer.

2. It is quite apparent from calculations of the reliability of the difference of two means on both initial and final tests in grades V and VI, that there is a significant increase in accomplishment in these skills at successive grade levels.

3. Calculations of the reliability of the difference between the mean of an unselected group of boys, and the mean score of team members on the soccer skill tests, show that team members tend to score markedly higher in all instances than do members of the unselected group. This is true of both fifth and sixth grade groups.

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[26] W. A. McCall, *How to Experiment in Education*, p. 93.
[27] *Ibid.*, p. 98 ff.
[28] *Ibid.*, pp. 27–28.
[29] *Ibid.*, p. 206.
[30] *Ibid.*, p. 63 ff.

TABLE VII

TABLE FOR CONVERTING TEST (RAW) SCORES INTO SCALE SCORES ON THE SOCCER SKILL TEST, GRADE V, 1930-31

Dribble		Throw in		Place Kick for Goal		Kicking Rolling Ball	
Raw Score	T Score	Raw Score	T Score	Raw Score	T Score	Raw Score	T Score
48.0 – 49.9	20	0	21*	0	16*	0	22*
46.0 – 47.9	25	1	25	1	18*	1	26
44.0 – 45.9	28	2	29	2	20	2	32
42.0 – 43.9	29	3	32	3	24	3	36
40.0 – 41.9	31	4	34	4	27	4	39
38.0 – 39.9	32	5	37	5	32	5	41
36.0 – 37.9	34	6	39	6	34	6	43
34.0 – 35.9	36	7	41	7	37	7	45
32.0 – 33.9	40	8	44	8	39	8	47
30.0 – 31.9	42	9	46	9	43	9	50
28.0 – 29.9	45	10	49	10	46	10	54
26.0 – 27.9	48	11	52	11	51	11	56
24.0 – 25.9	51	12	54	12	54	12	59
22.0 – 23.9	54	13	56	13	57	13	62
20.0 – 21.9	58	14	58	14	61	14	65
18.0 – 19.9	62	15	61	15	64	15	70
16.0 – 17.9	65	16	63	16	67	16	72
14.0 – 15.9	70	17	65	17	71	17	75
12.0 – 13.9	74	18	68	18	75	18	83
10.0 – 11.9	79	19	70	19	80	19	85*
		20	76	20	85*	20	87*

*estimated score

TABLE VIII

TABLE FOR CONVERTING TEST (RAW) SCORES INTO SCALE SCORES ON SOCCER SKILL TEST, GRADE VI, 1930-31

Dribble		Throw in		Place Kick for Goal		Kicking Rolling Ball	
Raw Score	T Score	Raw Score	T Score	Raw Score	T Score	Raw Score	T Score
39.6 – 41.0	20	0	19*	0	16*	0	20*
38.0 – 39.5	24	1	22	1	18*	1	24
36.4 – 37.9	26	2	26	2	20	2	30
34.8 – 36.3	29	3	29	3	24	3	35
33.2 – 34.7	32	4	31	4	28	4	38
31.6 – 33.1	35	5	33	5	31	5	40
30.0 – 31.5	38	6	36	6	33	6	42
28.4 – 29.9	40	7	38	7	36	7	45
26.8 – 28.3	43	8	41	8	39	8	47
25.2 – 26.7	45	9	44	9	42	9	49
23.6 – 25.1	47	10	47	10	45	10	51
22.0 – 23.5	50	11	50	11	48	11	54
20.4 – 21.9	52	12	53	12	51	12	56
18.8 – 20.3	55	13	55	13	54	13	58
17.2 – 18.7	59	14	57	14	57	14	61
15.6 – 17.1	62	15	60	15	60	15	64
14.0 – 15.5	66	16	63	16	63	16	67
12.4 – 13.9	70	17	64	17	66	17	70
10.8 – 12.3	74	18	67	18	69	18	74
9.2 – 10.7	82	19	70	19	75	19	78
		20	76	20	78*	20	82

*estimated scores

TABLE IX

TABLES FOR CONVERTING TEST (RAW) SCORES INTO SCALE SCORES ON THE SOCCER KNOWLEDGE TEST, GRADES V AND VI, 1930–31

GRADE V		GRADE VI	
Raw Score	T Score	Raw Score	T Score
−15 − −11	20	− 4 − 0	20
−10 − − 6	25	1 − 5	28
− 5 − − 1	29	6 − 10	33
0 − 4	34	11 − 15	37
5 − 9	38	16 − 20	40
10 − 14	41	21 − 25	42
15 − 19	44	26 − 30	45
20 − 24	47	31 − 35	48
25 − 29	49	36 − 40	50
30 − 34	52	41 − 45	53
35 − 39	54	46 − 50	56
40 − 44	57	51 − 55	58
45 − 49	59	56 − 60	61
50 − 54	61	61 − 65	62
55 − 59	63	66 − 70	63
60 − 64	65	71 − 75	66
65 − 69	67	76 − 80	68
70 − 74	70	81 − 85	70
75 − 79	75	86 − 90	72
80 − 84	81	91 − 95	74
		96 −100	78

4. A reliable difference, of 8.08, between the mean score of grade VI and the mean score of grade V on the soccer knowledge test demonstrates significant increase in soccer knowledge at successive grade levels.

5. Tests were scaled according to McCall's T scale method, and tables are available, in grades V and VI, for converting raw scores on soccer skill and knowledge tests to scale scores.

GENERAL SUMMARY

The object of the research reported in this study was:

I. To construct a test for use in measuring skill in the game of soccer. The problems involved in this were:

A. To demonstrate the procedure for selection of test items in a battery to measure soccer skills

B. To establish the validity of the selected test items and the battery by: 1. correlation of skill test results with the criterion of judged success in playing the game of soccer, 2. showing increase in accomplishment with successive ages and grades, and 3. comparing the mean of average unselected groups of boys with the mean score of those making the school team in soccer, which event requires superior ability in playing the game.

C. To determine reliability of the skill test elements and the final battery by computing self r's, by correlation with the criterion of judged success in playing the game of soccer, and with the final battery, finding

the intercorrelations of all the test items and computing the correlation between the sums of this series.

II. To demonstrate the construction of a soccer knowledge test and determine its validity and reliability.

III. To show the relationship between the soccer skill and knowledge test by running correlations between the two series of scores in both the fifth and sixth grades.

APPLICABILITY OF DATA

The tests reported in this study have proved of practical value as teaching tools, as a means of motivating the practice of technique in soccer, as a means of providing the pupil with definite knowledge of his accomplishment, and as one basis for more objective marks in physical education. When a pupil can cite his improvement on a graph posted on the gymnasium bulletin board he is doubly motivated to put forth his best efforts.

To the teachers who assisted in this study, these tests have demonstrated that the physical education period should not be a play period, but an instructional period. Instruction of the individual is enhanced when the instructor knows the skills of each pupil. This is possible when the pupil has been tested in a certain activity.

For the supervisor of physical education or for the general supervisor of the elementary grades, the tests have been one means of check-up on the quality of instruction given by the teacher in the physical education class period.

The writers hold this hypothesis to be true, namely, that definite progressions in physical education activities at any age level can be determined only after valid, reliable information concerning such activities is produced. It is believed that this study offers one means of determining such progressions in activities at the elementary school level.

SUGGESTION FOR FUTURE PROCEDURES

After three years of preliminary experimentation the writers find certain questions unanswered. This may be due to any one of the following reasons—the nature of the problem, the limitations of the data, or possibly to the situation in which the testing was done. This testing program has been carried on in an actual teaching situation with large groups of individuals, with which the physical education teachers are invariably faced. Other, though non-conclusive experiments have been carried on with these tests using smaller groups of boys, and the writers are led to believe that, statistically, the tests would have been more acceptable had a smaller group of boys been given the tests in a controlled experimental situation.

A. Does the giving of the Final Test at the end of the soccer season (when teams have been made, et cetera) affect its motivation?

B. Does the low correlation between skill and knowledge tests signify poor in-

struction on the part of the teachers, or insupportable grade placement of material?

C. Is it illogical to attempt a study of achievement in physical activities when no valid measure of motor ability for boys of these ages is available?

D. To construct a test of general athletic ability, for boys, would not the logical plan be to use as one element in a battery of skill tests for measuring general athletic ability, that test item from the battery of soccer skill tests which correlates most highly with judged success in playing the game of soccer?

E. Would it not be desirable to consider not alone age and grade in establishing test norms, but also other factors, such as height and weight?

F. Should a key vocabulary be developed for use as a tool in teaching soccer?

Test norms have been established for the schools in the two cities concerned with this study, but national norms cannot be set up unless a wider sampling of performance be taken from all parts of the country.

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SOCCER KNOWLEDGE TEST

Name ..... Age ..... Grade..... Date..... 19.....
School .....Score: Right..... Wrong..... Score.....

The aim of this examination is to show what you have learned from your study of soccer. It is not expected that you will be able to answer every statement.

The letters T and F have been placed before each statement given below. Draw a circle around the letter T if the statement is TRUE. Draw a circle around the letter F if the statement is FALSE or PARTIALLY FALSE. *Do not guess.* You will be penalized for each statement marked incorrectly by taking one point or credit from the number of statements marked correctly.

Examples are given below. Read them carefully and then proceed to answer the others in like manner.

T F Soccer is a game in which there is much running.
(Answer: Draw circle around T.)
T F In playing soccer the ball is thrown from one player to another.
(Answer: Draw circle around F.)
T F 1. The game is begun by a kick-off from center by the center forward in the direction of the field of play.
T F 2. The fullbacks play an offensive game.
T F 3. When the fullbacks play in "tandem style" that is, one behind the other, the defense is given depth.
T F 4. The player taking the throw-in shall throw the ball over his head, with both hands, in any direction he chooses.
T F 5. The goalkeeper, within the goal area may be charged if he is handling the ball.
T F 6. It is good play for the player taking the throw-in to drop the ball in the field of play and immediately play it again himself.
T F 7. A point may often be scored when the goalkeeper draws back his arm for a throw.
T F 8. Each goal kicked counts one point.
T F 9. In the attack the halfbacks should be guarding their opponents.
T F 10. The goalkeeper may clear out the ball by "fisting it."
T F 11. The top of the head should be used in heading the ball.
T F 12. The referee is relieved from putting a law into effect if by doing so he would be giving an advantage to the team making the foul.

T F 13. The center halfback plays behind the center forward for support on the attack.
T F 14. The ball is in play if it rebounds from a goal post or a cross bar into the field of play.
T F 15. The referee restarts the game after a temporary suspension by a center kick.
T F 16. A goal may not be scored directly from the kick off.
T F 17. The penalty for off side on the kick off is a free kick by the opposing side from the place where the foul was made.
T F 18. The ball is in play if it touches the referee when in the field of play.
T F 19. When a free kick is taken the ball must be played by another player before a goal may be scored.
T F 20. When a free kick is taken the kicker's opponents should come in as close to the ball as possible in an effort to block the kick.
T F 21. The ball is blocked by getting directly into its line of flight after it has left the opponent's foot.
T F 22. When a penalty kick is taken the defense should line up beside the goal keeper to help keep the ball from going through the goal.
T F 23. The object of the player who takes the corner kick is to so place the ball that one of his own side can easily kick a goal.
T F 24. Each player should "mark his opponent" when a throw-in is taken.
T F 25. When the attacking forwards have the ball the defending forwards should follow within kicking distance of their own halfbacks.
T F 26. A free kick is a kick at the ball, on the ground, in any direction the player chooses, with no interference from any other player on the field.
T F 27. The fullbacks play a defensive game.
T F 28. The right inside should kick with the right foot; left inside with the left.
T F 29. In case the goalkeeper "carries" the ball a free kick is given the opposing side.
T F 30. When the ball crosses the "touch line" it is put in play by a "throw-in."
T F 31. Players should do little dribbling in their own half of the field and never near their own goal.
T F 32. A penalty kick is given for a foul made by the defense in its own half of the field.
T F 33. After a goal is scored the side which did not score the goal shall kick off.
T F 34. The ball is lifted off the ground if the instep is used in kicking it.
T F 35. Throw-in is taken by a player of the opposite side to that which played it out.
T F 36. A goal kick is taken when the defense plays the ball behind the goal line.
T F 37. A rolling ball is best trapped by "collapsing the legs" on the ball.
T F 38. The goal keepers own penalty area is called the "goal area."
T F 39. All players, with the exception of the player taking the penalty kick and the opponents' goalkeeper shall be outside the penalty area, but within the field of play when a penalty kick is taken.
T F 40. Forwards, on the defense, play down the field within kicking distance of the player who takes the goal kick.
T F 41. The forward line closes in as the ball is carried in goal.
T F 42. Fullbacks mark the wings.
T F 43. As soon as the player has taken the throw-in he should take his position in the play.
T F 44. The throw-in is taken by a player on the team which sent it out of bounds.
T F 45. A free kick is given the opponents of a player who kicks the ball before it has touched the ground when dropped by the referee in restarting the game after a temporary suspension.

T F 46. Toe kicks send the ball straight along the ground.
T F 47. Players playing out of position lose their own chance to advance the ball.
T F 48. When the ball is kicked with the inside of the foot the force of the kick is limited but the ball may be kicked with great accuracy.
T F 49. Wing forwards play in such a position that they are less likely to be checked than other forwards.
T F 50. A player who is able to head a ball which is lower than his head shows good ability to handle the ball.
T F 51. After an illegal throw-in the opposite side is given a throw-in from the same place.
T F 52. The ball must be played by another player before the player taking the throw-in may again play the ball.
T F 53. The forward line plays a defensive game.
T F 54. On a goal kick attacking forwards play up to the goal area.
T F 55. Players must be ten yards away from the ball when a goal kick is taken.
T F 56. Fullbacks should play out considerable distance from goal.
T F 57. A goal kick is awarded the defense if the attacking side plays the ball behind the end line.
T F 58. The lines at each end of the field are the touch lines.
T F 59. When the wings make the attack the goal keeper should stay in goal, expecting a kick across goal.
T F 60. A player heads the ball in order to change its direction when it has been kicked high in the air.
T F 61. To kick the ball after it bounces is called trapping the ball.
T F 62. The player taking the throw-in shall use the chest throw.
T F 63. The most accurate and powerful kicker on the team should take the penalty kick.
T F 64. The names of the players on the forward line are, center forward, right inside, right wing, right halfback, left fullback.
T F 65. When a player takes a penalty kick the ball must be kicked forward.
T F 66. The player who kicks off at the start of the game is called "center forward."
T F 67. Halfbacks should take the throw-in in order to free the forward line for offensive play.
T F 68. When the ball crosses the end line it is put in play by a throw-in.
T F 69. The ball is dead if it touches the referee in the field of play.
T F 70. The ball is out of bounds if it hits the goal posts or cross bar and rebounds into the field of play.
T F 71. A player of the attacking side is off side if he crosses the center line before the kick off is taken.
T F 72. A goal is scored when the ball passes over the end line between the goal posts and under the cross bar.
T F 73. The side scoring a goal shall take the kick off.
T F 74. "Carrying" is called when a goalkeeper carries or bounces the ball a greater distance than two steps.
T F 75. Fullbacks should have a working agreement as to which shall attack and which shall cover the goal.
T F 76. When the game is started only players on the side which takes the kick off may come into the center circle.
T F 77. It is poor play for the goalkeeper to ever leave his goal area.
T F 78. A player should always advance the ball as far as possible before making a pass.
T F 79. A goal may be scored directly from a throw-in.
T F 80. The goalkeeper should as a last resort fall on a ball that cannot be cleared.
T F 81. Fullbacks should seldom dribble the ball.

T F 82. Halfbacks on the defense mark the attacking forwards on a goal kick.
T F 83. The penalty area is that space marked out in front of either goal, within which unfair play is punished by a special penalty.
T F 84. A free kick is awarded opponents if the player taking the penalty kick does not kick the ball forward.
T F 85. The kick awarded when the attack sends the ball over the end line is taken from the penalty kick mark.
T F 86. Players must be ten yards from the ball when a free kick is taken.
T F 87. A goal may be scored directly from a corner kick.
T F 88. A good dribbler touches the ball every other step.
T F 89. The lines at the side of the field are the touch lines.
T F 90. Halfbacks are both offensive and defensive players.
T F 91. If, in restarting the game after a temporary suspension, the ball goes over a touch or end line before it has been played by any players the referee shall drop the ball where it was when play was suspended.
T F 92. A player is off side if there are less than two of his opponents between him and their own goal when he plays the ball.
T F 93. The player taking the throw-in should stay out of the field of play until the ball has been played by another player.
T F 94. The goalkeeper should sometimes go out into the field of play if by so doing he can break up the attack.
T F 95. The referee restarts the game after a temporary suspension, by dropping the ball where it was when play was stopped, and it shall be in play when it touches the ground.
T F 96. In attack the halfbacks should be close to their forwards.
T F 97. A free kick is given the opposite side when an illegal throw-in is made.
T F 98. A goal may be scored directly from the kick off.
T F 99. A penalty kick is given the offense when a foul is made by the defense in the penalty area.
T F 100. If a player touches the ball with his hands a foul is called.

The Effect of Sugar Ingestion Upon Athletic Performance

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THERE exists a controversy among athletic coaches as to the value of feeding sugar in concentrated form to an athlete just prior to participation in an event. The very idea that sugar supplies helpful, additional energy in an extremely short time is not accepted by some. Others might credit any helpful influence to the factor of suggestion. The fact remains, however, that some coaches do advocate the ingestion of lump sugar as a means of increasing the motor efficiency of their athletes. In order to clarify the question at hand the following experiment was performed to show (1) whether or not sugar ingestion prior to athletic participation had any consistent effect, and (2) the per cent of increased performance through sugar ingestion, if any.

Eight subjects were available for the entire experiment. These included one instructor in physical education, three physical education student majors, and four students, chosen at random, from a physical education class in boxing. None of the men had had any specialized training in the activities required in the experiment, though all were in what is commonly known as good physical condition. The men participated in ordinary gymnasium costume consisting of gym shirt, shorts, and rubber soled shoes.

The events chosen for the experiment were the 40-yard dash, left and right hand grip, and back lift. These events constitute a test of speed, a localized test of strength, and a more generalized test of strength, respectively. All trials of all events were held indoors enabling rather constant atmospheric conditions to prevail. Stop watch timing was used in the dash, and standard dynamometers were used (manometer for handgrip and dynamometer with base for back lift) in recording performances in the strength tests. The events were run off in quick succession and always in the same order, one individual at a time. Subjects always reported between four and five o'clock in the afternoon. This allowed a sufficient interval after lunch to minimize as much as possible any effect of the previous meal upon the performance.

Rather than use the commercial form of lump sugar (sucrose, a disaccharid), tablets of dextrose (a monasaccharid) were obtained. Sugar in the latter form requires no digestion, and consequently is made avail-

able for use by the body very quickly. Two dextrose tablets weighing 2.4 gr. each, the equivalent of one cube of lump cane sugar, were given each day of the experiment according to the following routine.

The subjects performed each set of events twice each day in the same order as follows: 40-yard dash; left hand grip; right hand grip; back lift. Subjects were allowed to rest ten minutes between sets of trials in order to insure a return to normal breathing before the start of the second set.

The sugar was eaten before the second set the first two days, before the first set the next two days, again before the second set the following two days, and thereafter alternating each day. The following example will perhaps make this procedure clearer.

SUBJECT # 2 (D.B.)

(—) INDICATES WITHOUT SUGAR. (+) INDICATES WITH SUGAR

Trials	*40-yd.*		*L grip*		*R grip*		*B lift*	
	1.	2.	1.	2.	1.	2.	1.	2.
Apr. 18	—	+	—	+	—	+	—	+
Apr. 19	—	+	—	+	—	+	—	+
Apr. 20	+	—	+	—	+	—	+	—
Apr. 21	+	—	+	—	+	—	+	—
Apr. 22	—	+	—	+	—	+	—	+
Apr. 25	—	+	—	+	—	+	—	+
Apr. 26	+	—	+	—	+	—	+	—
Apr. 27	—	+	—	+	—	+	—	+
Apr. 28	+	—	+	—	+	—	+	—

It was necessary to change the order in the above manner in order to check more accurately the actual performance or set of trials which might be affected through the action of the sugar.

A five-minute interval was allowed from the time the sugar was eaten to the time the performance was made. In view of the fact that it is now believed that there is considerable absorption of the sugars from the stomach, a five-minute interval should be adequate time for the sugar to enter the blood stream, although positive assertion here is impossible.

The subjects knew they were eating sugar, and surmised that it might produce a beneficial effect upon their performance. Some check upon the possibility of better performance due to suggestion had to be included. This was accomplished by giving calcium carbonate tablets (which are non-energy producing), flavored with cinnamon before one set of trials, and the dextrose tablets before the other set during the last three days of the experiment. The subjects were informed that both tablets were different kinds of sugar, and that their performance would show which type was the better. The investigators feel that the subjects performed to the best of their ability on each trial because of natural rivalry resulting from such athletic activity. The subjects were informed of their own daily records, and any other subject's records which they might care

to know, except during the last three days of the experiment, when the calcium carbonate and dextrose tablets were given. On these days no performance records were revealed.

Reference to Figure 1 (a-d) will show graphically that the sugar action was consistent, and that the scores made under this condition were usually better. The figure also shows roughly the motor learning throughout the experiment. In order to show how much better the (+) performances (with sugar) were, the averages of the (+) trials and (—) trials (without sugar) of all subjects were computed by weeks, and are shown in the following tables:

	(— Av.)	(+ Av.)	Diff.	% Gain Due to Sugar	
		40-YARD DASH			
1st week	5.74 sec.	5.60 sec.	.14	*2.43*	
2nd week	5.50 sec.	5.40 sec.	.10	*1.81*	*Av. = 2.19%*
Check days	5.54 sec.	5.41 sec.	.13	*2.34*	
		LEFT HAND GRIP			
1st week	94.17 lbs.	95.43 lbs.	1.26	*1.32*	
2nd week	94.80 lbs.	97.80 lbs.	3.00	*3.06*	*Av. = 1.92%*
Check days	98.34 lbs.	99.60 lbs.	1.26	*1.26*	
		RIGHT HAND GRIP			
1st week	101.30 lbs.	103.43 lbs.	2.13	*2.05*	
2nd week	101.50 lbs.	104.08 lbs.	2.58	*2.47*	*Av. = 2.25%*
Check days	105.73 lbs.	108.17 lbs.	2.44	*2.25*	
		BACK LIFT			
1st week	111.74 lbs.	112.46 lbs.	.72	*.64*	
2nd week	112.83 lbs.	116.22 lbs.	3.39	*2.91*	*Av. = 1.41%*
Check days	117.87 lbs.	118.69 lbs.	.82	*.69*	

The average better performance for all events throughout the entire experiment and the average better performance for all events on check days only was computed, as shown in the following tables:

Average better performance throughout entire experiment		Average better performance on check days only	
40-yard dash	*2.19%*	40-yard dash	*2.34%*
L hand grip	*1.88*	L hand grip	*1.26*
R hand grip	*2.25*	R hand grip	*2.25*
Back lift	*1.41*	Back lift	*.69*
Mean =	*1.93%*	Mean =	*1.63%*

A survey of the results shows an average better performance for all trials on all events of 1.93 per cent, with the greatest increase in the right hand grip. But for the check days the average better performance is somewhat lower, namely 1.63 per cent, with the 40-yard dash showing the greatest increase.

It is interesting to note that the per cent decreases decidedly from the first event to the last, with a rather sudden drop after the first three events. This might be interpreted as meaning that any effect the dextrose might have had at the beginning of the set was wearing off rapidly by the time the last trial of the set was performed.

The percentages quoted do not convey much meaning, perhaps, unless translated into seconds and pounds. Taking the scores for the check days only the following results are noted:

40-yard dash—.13 sec. faster with sugar
L hand grip—1.26 lbs. greater with sugar
R hand grip—2.43 lbs. greater with sugar
Back lift—.826 lbs. greater with sugar

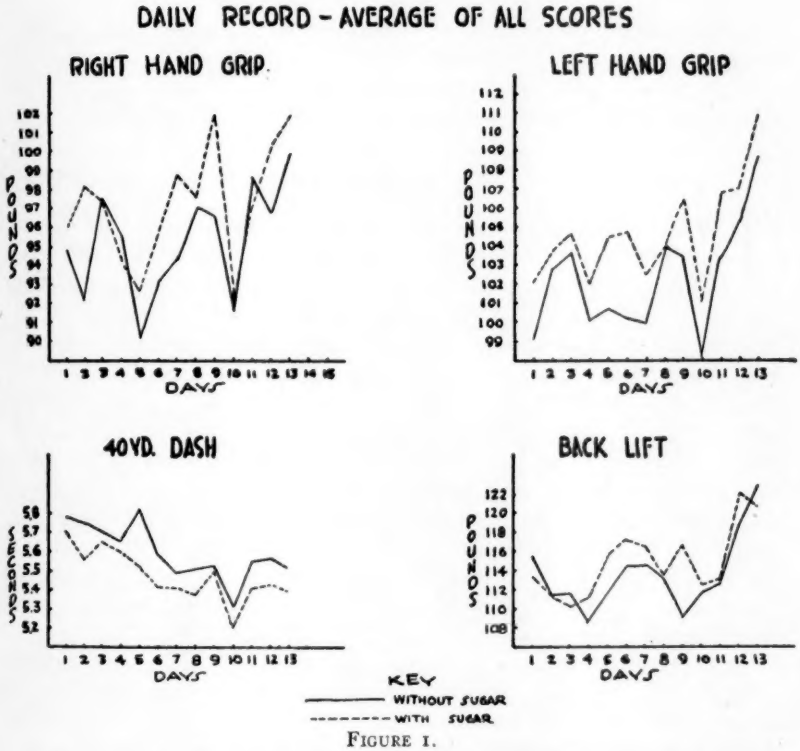

FIGURE 1.

The question of the effect of sugar ingestion upon athletic performance is partly answered. Indications are given that a beneficial result is obtained. Under the conditions existing in the experiment the per cent of improvement in performance is also indicated. But many things remain to be answered. How much sugar should be eaten to attain maximum performance? How much time shall be allowed between the ingestion and the performance? What factors influence the action of sugar, and how does the action vary in different individuals? Does the increased motor efficiency warrant using such a procedure? Is the principle back of the thought, namely that of "pepping up" the athlete, sound? The investigators close by using the old phrase i.e., future experimentation will have to determine the answers to these questions.

Re-Socializing Effects of a Highly Diversified Program of Physical Education for the Mentally Ill*

By

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INTRODUCTION

TWELVE years ago, upon being placed in charge of the Department of Physical Education at a neuropsychiatric center, I was, among other things, very forcibly impressed with the surprising normal conduct of many patients while participating in desirable forms of physical exercise and, apparently, their more wholesome social interests and improved social feeling. A few years later, upon attempting to supervise a similar program for a large group of psychotic patients, I was strongly impressed with their relatively normal conduct while participating in many forms of exercise. I also noted that there appeared to be a tendency of psychotic patients toward progressive inactivity of first the accessory, and then the fundamental, physical processes. It appeared possible that the natural and available response activities inherent in play might attack this basic tendency toward physical retardation. I also noted that among a large number of patients who were discharged as improved or cured over a period of years, approximately 85% of these patients had participated in formal or informal exercise. I also observed in daily contact with hundreds of psychotic patients an apparent fundamental difference in the ease with which the patient could be inducted into the mechanisms of play and work. Play appeared to represent a most natural activity and to be generally rooted in instinctive reaction. There appeared to be a most natural relation between play and desirable social responses. In a later study of comparative processes of work and play, play activities appeared to be more natural, more spontaneous, less subject to environmental disturbance, the attentive processes were most actively and easily maintained, associations more spontaneously and strongly formed, the volitional sphere was often stimulated to an unusual degree and the affective tone aroused in a surprising exercise of emotional acts and inhibitions.[1]† In this connection I was very much impressed with the experience of Dr. Brush of the Burke Foundation of White Plains, New York, in his experi-

*This paper was presented before the A. P. E. A. Convention in Philadelphia.

†The reference numbers refer to bibliographical references at the end of the article.

ence in handling over 5,000 patients a year for almost every subnormal condition. Dr. Brush feels that physical education has a distinctive place in dealing with the subnormals and can be utilized more extensively than work. Dr. Brush states that "physical education should be more utilized by the therapist through skilled adaptations to prevention, convalescence, physical and neuro-mental reconstruction, and personality testing for better adjustments to social and industrial living."[2] It was also noted that in many systems of hospitalization for mental and nervous diseases, medication comprises generally not more than 20% of the patient's time in the institution. The remaining 80% is devoted to convalescence. In this recuperative stage acute medical treatment is rarely indicated. The patient is then subjected to convalescent treatment which includes in general many forms of neuro-mental readjustment and affords the basis for the reconstructive treatments, particularly the various stages of re-socialization.[3]

THE PROBLEM

This situation was rendered more tangible upon cursory observation of the records of 600 psychotic patients who were interviewed relative to their play interest. This represented practically all types of the mentally ill—approximately 75% being of the dementia praecox group. Of this 600, 52 for various reasons could not be checked upon as to their reaction to physical exercise; 76, because of organic reasons, could not participate. Of the remainder, 54% stated they had an interest in exercise, particularly some competitive game. Of the remaining number who declared they had no interest, 84% when placed in actual play situations, responded favorably, and many of this group became star athletes. Of those who stated they had interest in exercise, 89% participated and the remaining group would not take part finding numerous and diverse reasons. This observation confirmed the suggestion that physical education had a distinctive approach to the mentally ill and would possibly prove a valuable medium particularly in overcoming characteristic tendencies toward negativism.

CONCEPTS OF MENTAL ILLNESS

In going into the matter of mental illness and examining the many concepts in psychiatric literature, one is impressed with the essential social problem. White, Adler, Jung, Jellife, and Bleuler insist upon the basic social aspect. The viewpoint is best expressed by Bleuler in the following quotation, "nowhere is the question 'sick or not sick' put so often in such an inexorable manner and with such weighty consequences as in the judgment of mental conditions—so far as the concept of insanity has become at all practicable, it rests not upon medical or psychological criteria, but on the idea of social incapacity."[4] The fundamental social character of mental illness and the varied social responses evoked by a highly diversified program of physical education disclosed the possibility of an im-

portant relation between the two. The economic importance of this problem should also be mentioned. Dr. R. G. Hoskins, who has been making an exhaustive research for Harvard University, states that economic costs of hospitalization of the mentally ill in this country, coupled with the economic loss of their withdrawal from industry, represents an expenditure of between one and two million dollars daily.[5] Dr. Charles H. Mayo says "we pass through more of the wonders of life in forty years than was possible for old people in the past. The world has moved ahead so fast as regards material civilization that man has almost, for the moment, got behind in his power of adaptation. Every other hospital bed is for mentally afflicted, insane, idiotic, feeble-minded, or senile persons. It seems that if physical education can assist in the rehabilitation of the mentally ill that it has a most important, as well as distinctive function."

METHODS TO BE FOLLOWED

In arriving at some estimation of resocializing effects of physical education for the mentally ill, one is confronted with a consideration of most desirable methods. In this connection, Burnham says "in the study of anything so elusive as human nature, it is usually well when possible to employ all available methods in any case induction, observation and experiment. Statistics seem so convincing and are sometimes so misleading, however, that control by experiment is especially desirable."[6] In this study the difficulty of providing rigorous scientific data is apparent from the foregoing as well as for many other reasons. Burnham further reminds us that "we have no adequate standards, either quantitative or qualitative, to measure the social aspects of personality."[7] This is especially true of the social aspects of physical education for the mentally ill. In this paper, no claim is made that we have provided rigorous and exact scientific data. Much of the material discovered must necessarily be general. This is essentially a problem of re-education and re-socialization. With Franz we may say that "the re-education of the insane depends entirely upon the replacement of bad, perverted, peculiar, slovenly methods of reaction by habits which are social and conventional."[8]

In this special field, therefore, physical education must be viewed from its re-educational standpoints. The fundamental idea is not to create new reactions but to re-establish motor and mental processes which, due to illness, have been inhibited, distorted, or temporarily lost to consciousness. We must also remember that the capacity for any individual for adjustment or re-adjustment to his environment is dependent upon three levels of animal reaction enumerated by White, as follows: "The first or phylogenetically the oldest is the physico-chemical level, the level of such functions as circulation, growth, digestion. It is the level of the endocrine glands and the sympathetic and autonomous nervous systems and is well represented by the chemical regulators or metabolism. The next level is the sensory-motor level integrated by the peripheral nerves, spinal cord,

and brain stem. It is the level of the reflex. The third level is the psychic. Here we are not dealing with questions of leverage, hydro-dynamics, or temperature, with acids, bases or harmonies, nor yet with simple or complex reflexes or nerve cells, nerve fibres, or synapses. Here we are dealing with symbols, and symbols only, and so this level may aptly be further qualified as the symbolic level."[9] White reminds us that in his evaluation of the conduct of many individuals these various levels are not explanatory of each other. For example, one cannot explain the symbolic level by the physico-chemical level. The problem is further complicated by the fact that many sub-normal types live upon a purely vegetative level and do not reach the social level. While these conclusions are undoubtedly very general and in some instances vague, I feel (to use Lashley's expression) "that it is better to be vague than to be wrong."

FOUNDATIONS OF RE-SOCIALIZATION

In determining upon the general aspects of re-socialization of the psychotic patient, one is impressed by the difficulty of establishing in the psychotic patient definite objectives. James' statement of the problem in normal psychology is particularly appropriate here: "If with the desire there goes a sense that attainment is not possible, we simply wish, but if we believe that the end is in our power, we will that the desired feeling, having or doing shall be real and real it presently becomes, either immediately upon the willing or after certain preliminaries have been fulfilled."[10] The fatalistic beliefs of the psychotic patient that an attainment is not possible or that it is undesirable, complicate the problem of establishing clear cut objects based upon regular educational stages. Psychotic patients vary greatly and may, in some cases, have definite objectives. Dr. C. H. McCloy points out three types of objectives which are significant to the teacher. They are 1. direct objectives—these can be quite validly and directly determined, and from a standpoint of motivation they are the most important ones for the teacher; 2. Associate objectives—these are of a more indirect and situational nature and help the pupil to adjust his direct objective; 3. indirect objectives—these are purely the teacher's objectives but may be later transferred to become an interest and a definite objective of the pupil.[11] All these forms of objective motivation may, through re-education, be utilized by the psychotic patient.

The general objective in this field of re-socialization is what James terms "the will to live" or the social will. In this connection, it is well to give James' definition of *will* which he states "involves memory of past acts and nothing else but consent that they shall occur again."[12] As a result of many years of supervision found in psychotic patients in physical education, it is my belief that physical exercise for this specific problem of resocialization must be based upon a conception of the individual as fundamentally a social being to be attacked by social practices and precedents at varying social levels. The ideal progression as stated in an article

in July, 1931, *Mental Hygiene* would represent in general the following stages:

STAGES OF RE-SOCIALIZATION

1. Unsocial or anti-social feeling
2. Social feeling
3. Social tenderness (Adler)
4. Social interest
5. Social participation
6. Social responsibility
7. Relative social evaluation of others
8. Relative social evaluation of self[13]

The psychotic patient may not pass through these various stages. He may start at different levels and may stop at any stage. Furthermore, the element of time complicates this idea of progression; ten years may supervene between certain stages. Generally, however, this scheme represents the stages of re-socialization through which the psychotic patient may pass and provides definite objectives for the physical educator who is attempting to help the psychotic patient. In this connection, Adler states a problem when he says that "patient's goal will often lie beyond the boundary of the attainable but far behind the fighting front of life."[14]

DISTINCTIVE ELEMENTS OF PHYSICAL EDUCATION IN THE SOCIAL PROCESSES

Observation of the psychotic patient and later simple tests proved that in order to penetrate the patient's attentive field, impressions must be simple. This is well expressed by Royce as follows: "This law that our consciousness constantly tends to the minimum of complexity and to the maximum of definiteness is of great importance for our knowledge—if things have more than a certain complexity, not only will our limited powers of attention forbid us to unravel their complexity, but we shall strongly desire to believe the things much simpler than they are, for our thoughts about them will have a constant tendency to become as simple and definite as possible. Put a man into a perfect chaos of phenomena: sounds, sights, and feelings, and if the man continues to exist and be rational at all, his attention would doubtless find for him a way to make up some kind of rhythmic regularity which he would impart to the things about him so as to make him think he had discovered some law of sequence in this mad new world."[15]

Games properly selected with careful reference to the patient's interest and intellectual capacity produce those simple and unified impressions which are so valuable in provoking fundamental social attitudes. The physical educator must, of course, take cognizance of the basic and fundamental seclusive character of the patient which is manifested so strikingly by his gradual withdrawal from society. This process is very vividly described by Adler when he says "a lasting war must have occurred, dur-

TABLE 2

TABLE OF RE-SOCIALIZATION THROUGH PHYSICAL ACTIVITY OF THREE PSYCHOTIC PATIENTS

Type of Activity	*Psychical social correlates*
PATIENT X	
First Year—Refused to participate in any activity	Introverted, antagonistic, anti-social
Second Year—Played baseball catch with one fellow patient	Introverted, no social interest, timid
Third Year—Played baseball on ward team	Disturbed by social relationships but shows vacillating confidence
Fourth Year—Played baseball on patient's first team	Not comfortable in group, rebuffed by responsibility
Fifth Year—Played baseball on first team and played handball	More at ease in group relations, more confident
PATIENT Y	
First Year—Calisthenic exercises	Belligerent toward group, markedly anti-social
Second Year—Evinced interest in swimming	Superior attitude toward group, antagonistic but not so belligerent
Third Year—Played horseshoes in solitary manner	Feels repulsed by group, ashamed and ill at ease in crowd
Fourth Year—Calisthenic exercises and swimming	Acquiescent but uncomfortable in social group
Fifth Year—Calisthenic exercises and swimming	Chief pleasure is in solitary experiences but slightly more at ease in group
PATIENT Z	
First Year—Bowled in solitary manner	Seclusive, introverted, would not talk, fearful
Second Year—Bowled with one fellow patient	Seclusive, introverted, timid, more co-operative; would answer questions in short sentences
Third Year—Bowled in ward contests	Timid and uncomfortable in social group but more at ease than formerly
Fourth Year—Bowled in patients' weekly tournaments	Shows some elements of confidence, smiles, returns greetings, works more steadily, appears to be happier
Fifth Year—Bowled on patient's first team	Shows confidence in bowling, carries out limited conversation, co-operative, shows regard for rights of others

ing the course of which his connections with the world about him have been dissolved little by little, so that he now stands in open opposition to the social feeling. Every type of influence upon his behavior is now made more difficult or impossible. One views the dramatic spectacle of a human being who responds to every attempt to influence him with a counter-attack of opposition."[16] The educational significance of physical education, in this connection, is also emphatically stated by Adler, "the manner with which a child approaches a game, his choice and the importance which he places upon it, indicate his attitude in relation to his environment and how he is related to his fellow men, whether he is hostile or whether he is free, and particularly whether he has a tendency to be ruler is evident in his play; and in observing a child in his play we can see his whole attitude toward life."[17]

This is also true of the adult psychotic patient. Observation of the reactions of hundreds of psychotic patients to a highly diversified program of competitive games demonstrated the importance of graduating these exercises to conform to the social tolerances of the patient. It was found that psychotic patients differ in their capacity to meet the various complexities of social relations similarly to the manner in which they vary in carrying out the necessary motor responses in playing different games. A game involving a high degree of sustained competition would cause many timid types who had not advanced through the necessary stages of resocialization to shrink from the game and feign, in many cases, various forms of physical weakness or injury. In general it was found that four types of formal competition were advisable:

TYPES OF GAMES

I. Highly competitive socializing play exercises involving a high degree of motor skill, muscular co-ordination, and moderate intelligence, such as the regular game of baseball, tennis, and volleyball. Many psychotic patients with natural aptitude, interest, and training can compete favorably with strong teams in these games.

II. Convalescent play exercises. These exercises involve but little natural aptitude and skill, are relatively low in elements of fatigue, and are of a relaxing nature. For example: horseshoes, casual ball play, croquet, and walking exercises.

III. Gymnasium games. These games may be played indoors and involve adaptation of many fundamental game exercises so as to meet the needs of particular groups, and are adaptable to size of courts, etc., and to the immediate physical and social tolerance of the patient. Impromptu games.

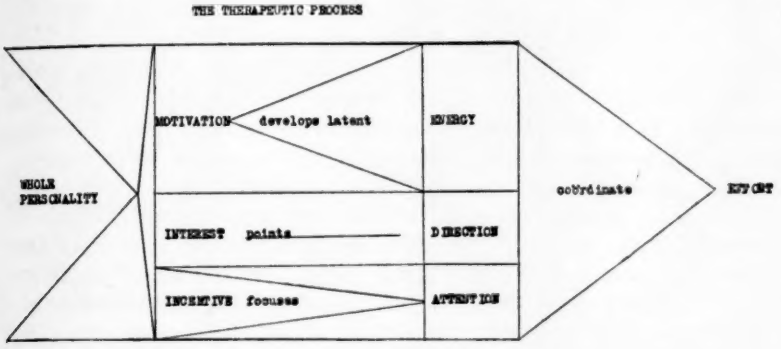
IV. Special field day activities. These activities are generally divided into two groups:

(a) Personal competitions involving exercise of speed, endurance, strength, skill, attention, or alertness such as tug of war, broad jump, shot put, etc.

(b) Novelty events in which success depends more upon the element of chance than upon skill; for example, turtle race, balloon race, etc. In these events the socializing elements predominate over the purely competitive factors.

The controlling consideration in inducting psychotic patients in games for the purpose of re-socialization is to make them accessible to his particular social level. It was found also that games to be of value as social medicine must be studied from the standpoint of educational approach. It was found for example that the vast majority of patients, especially those deeply deluded or actively hallucinated, could not be interested in games by oral methods. The effective plan was found to consist in the establishment of control situations. The patient was placed in a play en-

vironment or in an actual play situation and in this manner inducted into the suitable exercise with considerable success. John Dewey's maxim "we learn by doing" seems to be valid in this relation. By observation and experiment, it was found that the crux of the problem in inducting these patients into exercise was to establish a motivation, the capacity in most cases being present. The therapeutic process appeared to progress somewhat as follows:



PRIMARY AND SECONDARY PERFORMANCES

In studying the reaction of the psychotic patient, it soon became apparent that one should observe general types, such as the introvert and extrovert, rather than the disease entities. This viewpoint seems to be generally accepted now in the field of re-education in the mentally ill.[18] It was also discovered that a most important distinction must be drawn between the reflex, instinctive, and emotional acts and the voluntary movements of the patient. This fundamental difference has been expressed by James when he says that "the reflex, instinctive and emotional acts are primary performances and voluntary movements must be secondary, not primary, functions of our organism."[19] The therapist often fails to induct the psychotic patient into suitable forms of exercise because of unconscious attempts to establish voluntary movements as primary performances. This situation is well demonstrated in the statement of a manic depressive patient who wrote a most interesting article upon his reaction to physical exercise. He stated that at first he was very fearful, that he was repulsed at the idea of engaging in volleyball—that he could not focus his mind upon the game and as simple as it was, could not decide to assume the responsibility of playing. When placed upon the volleyball court, however, and having the ball served to him, he stated that he just naturally followed the ball without conscious effort and that he almost felt himself being carried away in a normal involuntary exercise. Hitting and catching the ball involved little or no conscious effort and these acts came to him as reflex. After experiencing this stage of reflex and instinctive activity, and he had learned the game, he then

became capable of voluntary action which expressed itself in a scientific study and playing. The instincts and emotional acts as primary performances were also evident. Upon every hand James' statement was confirmed when he said that "every object that excites an instinct, incites emotion as well."[20] The emotions of psychotic patients were observed with the idea of utilizing and re-directing them into channels of desirable voluntary activity.

THE DISTINCTIVE EFFICACY OF GAMES

In observing the play experiences of psychotic patients, one observes the truth of James' statement when he says "as a gregarious animal, man is excited both by the presence and absence of his kind."[21] White states the situation somewhat differently when he emphasizes the fact that "Man is a social animal capable of modifiable behavior."[22] This inherent social nature of the individual appears to be evoked most distinctly by suitable games. It appears that there are many effective stimuli to social consciousness to be found in the many varied response activities of play. "Play represents many of the expressions and inhibitions characteristic of the ideal social status, the evolution of the unit into the organism," the answer to the classic question of Aristotle, "How may the city be built of good citizens?"—In games these elements of feeling were dissipated in action and found adequate expression in emulative accomplishment. They were often called out to activate some strongly desired physical accomplishment, as for example, when the hebephrenic praecox patient became tired of losing the game and with a gesture of elemental anger made an effort beyond the range of his general lowered therapeutic level. Feelings of satisfaction and prospect of winning often stabilized the game and provided stimulus for its continuation. Games engender the feeling of importance, of unity with others, willingness to subordinate oneself to others, appreciation of opponent's play, of the good or poor work of others, respect for the property of others, loyalty, utilization of the value of concerted group action and the necessity for delegating authority, and self-realization through group recognition and applause.[23]

PSYCHOLOGICAL VALUES

Paradoxical as it may seem, the end of physical education for the mentally ill is not primarily the establishment of muscular activities and co-ordinations but rather the creation of social activities in the patient which harmonize with the social customs in such a manner that he can become an integral part of society.[24] Thus it seems that the values to be emphasized are psychological and the case presents itself as to the susceptibility of the normal and subnormal types to psychological values. This involved study was made by Lowenstein, who "found the tendency to psychogenic reactions in 44% of epileptic patients, 54% of healthy persons, and 73% of those with paranoid forms of schizophrenia; in 90%

of catatonic patients, and in 96% of hysterical patients."[25] The susceptibility of psychotic patients to psychogenic reactions is shown in many forms of physical exercise, particularly games. The general psychologic nature of games is expressed by James as follows: 1) All simple active games are attempts to gain excitement yielded by certain primitive instincts, through feigning that the occasion for their exercise is there. They involve imitation, hunting, fighting, rivalry, acquisitiveness, and construction, combined in various ways; their special rules are habits, discovered by accident, selected by intelligence, and propagated by tradition; but unless they were founded in automatic impulses, games would lose most of their zest. 2) Another sort of human play into which higher aesthetic feelings enter—love of festivities, ceremonials, ordeals, etc.—an element common to all these ceremonial games, as they may be called, is the excitement of concerted action as one of an organized crowd.—There is a distinct stimulation at feeling our share in their collective life. Our reaction upon it is to join them and do what they are doing and our willingness to be the first to leave off and go home alone. This seems a primitive element in our nature, as it is difficult to trace any association of ideas that could lead up to it; although once granting it to exist, it is very easy to see what its uses to a tribe might be in facilitating prompt and vigorous collective action."[26] The discovery by James of the foundation of automatic impulses in games undoubtedly explains their distinctive field for the psychotic patient as well as their distinctive value in the field of re-socialization.

MOTIVES FOR SOCIAL REACTIONS

As previously stated, the crux of the problem of re-socialization as affected by various forms of physical exercise is to establish the motivation; as the capacity is ordinarily present. One must take into consideration, however, the genetic development of social motives. It is advisable to seek the highest available motive for the purpose of re-socialization. Burnham has shown an interesting sequence of motives. The child is first self-centered and motivated by self interest. Later on he shows a desire to do things for the sake of parents or other members of the family. The child then enters into the small social group on the playground or the gang and does things for this group. As he enlarges his experience he may do things for a larger group such as a church or school. The next higher motive may be demonstrated by aid to public service.[27] The psychotic patient may regress to many levels upon which he may be appealed to by any one of these motives, and in the administration of physical education it was found advisable to seek the best available motive for social reaction which the game or exercise could produce.

GRADUATED EXERCISES

The necessity for graduated games to meet the social tolerance of the psychotic patient became evident at the beginning. It was necessary not

only to graduate these exercises as to motor complexity but particularly as to the psychical qualities of what Adler terms "a disjunctive effect of anger, sadness, disgust, misuse of emotion, fear, and anxiety and the conjunctive effect of joy, sympathy, modesty;"[28] to these might be added the will to try and the will to survive. It is readily apparent that the value of physical education for the mentally ill rests upon these psychological qualities rather than the purely organic and physical actions produced. To meet the patient's peculiar needs and to be acceptable to his various levels, a highly diversified program of physical activities appears to be necessary. For this purpose I have found the following competitive games of value: volleyball, baseball, tennis, bowling, handball, golf, games of a more convalescent nature such as croquet, horseshoes, wheelchair croquet, various gymnasium games, field day exercises, swimming, marching, certain personal exercises such as rope skipping, Indian club and dumb-bell exercises, novelty events—all these and many other forms of exercise have a place in the re-socialization of the mentally ill. It has been found in many cases that the patient can be appealed to through but one agency and once the initial participation is made his activities can be transferred into wider fields more closely related to his social and economic recovery.

RE-SOCIALIZATION MEDIA

All the social sciences undoubtedly have a contribution which may be utilized for the improved social adjustment of the psychotic patient. The objective is to improve the social status and therefore all types of the mentally ill should be subjected to these re-socializing factors. White states the objective as the "socialization of strivings."[29] The social feeling is inherent in normal life and very probably in the subnormal individual. Adler states the case as follows: "This social feeling remains through life, changed, colored, circumscribed in some cases, enlarged and broadened in others until it touches not only the members of his own family, but also his clan, his nation, and finally the whole of humanity. It is possible that it may extend beyond these boundaries and express itself towards animals, plants, lifeless objects, or finally towards the whole cosmos. An understanding of the necessity for dealing with man as a social being is the essential conclusion of our studies."[30]

From the observation of hundreds of psychotic patients in their play reactions, the necessity of stressing the social nature of the normal play experience provided most evident character and conduct objectives toward which the play experience should naturally lead. These objectives are typified in the baseball code which was used at the Veterans' Administration Hospital, Perry Point, Maryland, in the patients' baseball league. Social admonitions presented to the psychotic patient as an academic procedure are very probably of little value in re-socialization. Closely related, however, to a happy and normal play experience they become part of the sentiment of the game and have most valuable re-socializing tendencies.

"OUR BASEBALL CODE"

1. Always play fair.
2. Be on time.
3. Clean Sportsmanship wins.
4. Develop good teamwork.
5. Errors in the game or in conduct are costly.
6. Frankly admit your mistakes. Don't blame it on the other fellow.
7. Give all you have. Don't let down.
8. Help your team-mates.
9. Improve by practice and watching others.
10. Judge carefully and charitably.
11. Keep your eye on the ball. Don't be caught asleep.
12. Learn signals and plays.
13. Mind what you are told. Pay attention to your captain.
14. Never forfeit a game.
15. Obey the rules.
16. Practice often.
17. Quitters are unpopular, because they are unnecessary failures.
18. Run out all hits and run hard.
19. Stick to your team. Be a booster.
20. Touch all bases. Be attentive.
21. Umpires, like yourself, may make mistakes. Abide by their decisions.
22. Victory means steps toward the championship.
23. Watch the ball and the batter.
24. A hit in a tight place marks the real ball player.
25. Attentive, courageous players receive recognition and applause.

TABLE 3

TABLE OF PHYSICAL ACTIVITIES OF EIGHT HUNDRED AMBULATORY PSYCHOTIC PATIENTS WITH REFERENCE TO RE-SOCIALIZING VALUES

Activity	Number Who Participate Regularly	Number Who Participate Irregularly	Re socializing Values
Swimming	260	70	Fair
Baseball	101	68	Very good
Volleyball	112	46	Very good
Bowling	68	25	Good
Tennis	60	22	Very good
Golf	78	36	Very good
Handball	28	12	Good
Horseshoes	26	23	Good
Croquet	21	19	Good
Pocket billiards	78	21	Fair
Calisthenics	600	112	Fair

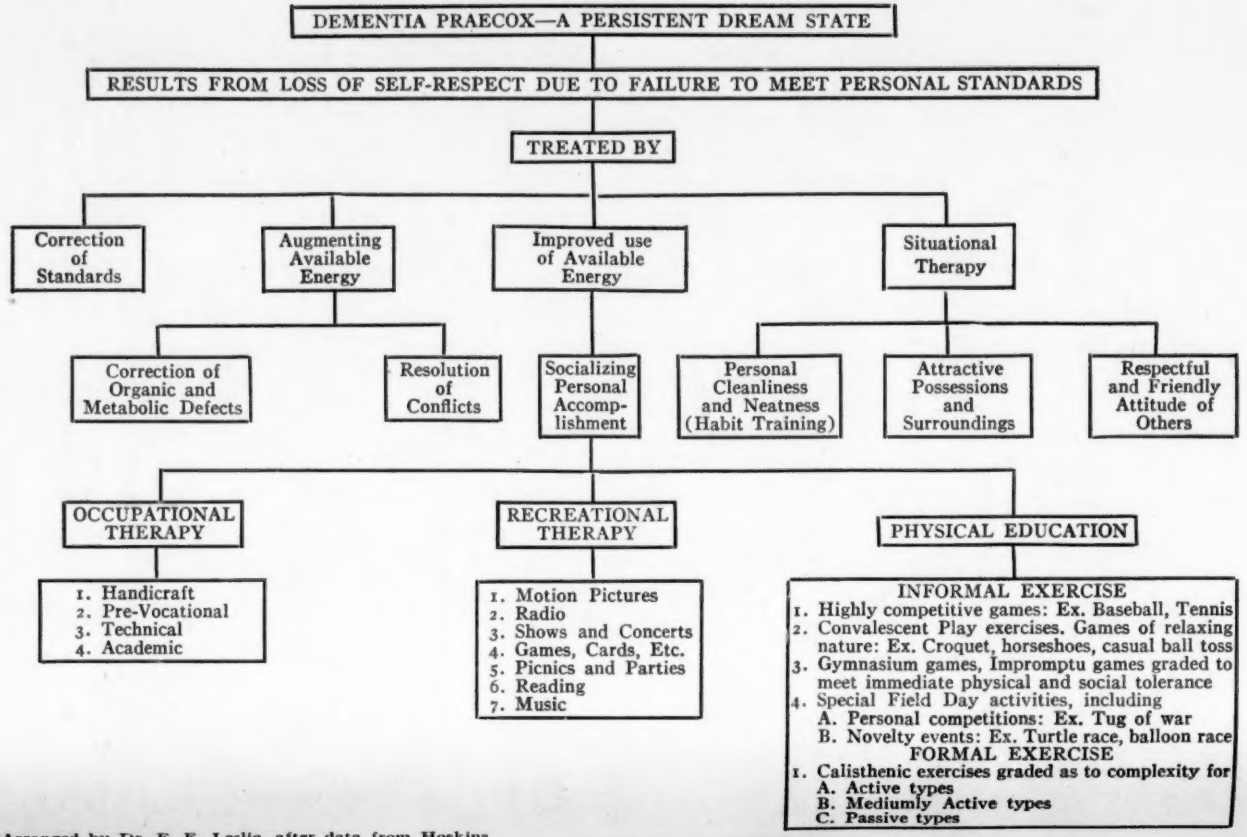
Note: Many of these patients participate in two or more activities.

Viewing the patient subjectively for the purpose of determining the adjustments which he must make to reality in order to become socially acceptable, one finds that there are many adjustments he must make or fail to make. A comprehensive list as formulated by Marsh is as follows:

SOCIAL ADJUSTMENTS

1. Adjustment to hospitalization.
2. Adjustment to the problem of religion and philosophy.
3. Adjustment of the problems of growth.

TABLE NO. I*


DEMENTIA PRAECOX—A PERSISTENT DREAM STATE
RESULTS FROM LOSS OF SELF-RESPECT DUE TO FAILURE TO MEET PERSONAL STANDARDS
TREATED BY
Correction of Standards
Augmenting Available Energy
Improved use of Available Energy
Situational Therapy
Correction of Organic and Metabolic Defects
Resolution of Conflicts
Socializing Personal Accomplishment
Personal Cleanliness and Neatness (Habit Training)
Attractive Possessions and Surroundings
Respectful and Friendly Attitude of Others
OCCUPATIONAL THERAPY
1. Handicraft
2. Pre-Vocational
3. Technical
4. Academic
RECREATIONAL THERAPY
1. Motion Pictures
2. Radio
3. Shows and Concerts
4. Games, Cards, Etc.
5. Picnics and Parties
6. Reading
7. Music
PHYSICAL EDUCATION
INFORMAL EXERCISE
1. Highly competitive games: Ex. Baseball, Tennis
2. Convalescent Play exercises. Games of relaxing nature: Ex. Croquet, horseshoes, casual ball toss
3. Gymnasium games, Impromptu games graded to meet immediate physical and social tolerance
4. Special Field Day activities, including
A. Personal competitions: Ex. Tug of war
B. Novelty events: Ex. Turtle race, balloon race
FORMAL EXERCISE
1. Calisthenic exercises graded as to complexity for
A. Active types
B. Mediumly Active types
C. Passive types

*Arranged by Dr. F. E. Leslie, after data from Hoskins.

4. Adjustment to reality.
5. Adjustment to the problems of work and relaxation.
6. Adjustment to the family.
7. Adjustment to the problems of sex.
8. Adjustment to the emotions.
9. Adjustment to people and social customs.
10. Adjustment to the problems of self-expression.
11. Adjustment to the inward drives.
12. Adjustment to the physical world.
13. Adequate and inadequate methods of adjustment.[31]

As an adjuvant to the solution of these problems, physical education undoubtedly has a wide and potential field.

FAULTY SOCIAL AND MOTOR REACTIONS

There are, of course, many causes for faulty social and motor reactions in the psychotic patient. A most comprehensive explanation appears in Karl Menninger's table of "Abnormal Psychological Reactions." In accordance with his viewpoint, these faulty reactions are due to deficient, excessive, or distorted perception, intellection, emotion, or volition.[32]

MENNINGER'S TABLE*

From *The Human Mind*, Knopf and Co., New York.

	PERCEPTION "Aesthesia"	INTELLECTION "Gnosis"	EMOTION "Thymia"	VOLITION "Bulia"
DEFICIENT "Hypo"	Deficient Perception (Hypo-aesthesia)	Deficient Intellection (Hypognosis)	Deficient Emotion (Hypothymia)	Deficient Volition (Hypobulia)
EXCESSIVE "Hyper"	Excessive Perception (Hyper-aesthesia)	Excessive Intellection (Hypergnosis)	Excessive Emotion (Hyperthymia)	Excessive Volition (Hyperbulia)
DISTORTED "Para"	Distorted Perception (Paraesthesia)	Distorted Intellection (Paragnosis)	Distorted Emotion (Parathymia)	Distorted Volition (Parabulia)

*By Permission of authorized publishers.

Stanley Hall emphasizes the motivating factor and states these faulty reactions are generally due to what he terms lack of "psychic impulsion."[33] Observation confirms the fact that a fair degree of capacity is usually present and that inadequate motivation is a most important factor. Faulty motor reactions have, in many cases, been ascribed to organic lesions. From recent investigations, however, Lashley says "in working with animals and with human patients, I have been more and more impressed by the absence of the chaotic behavior which we might expect from the extent and irregular form of the lesions. The unity of action seems to be more deeply rooted than even the structural organization."[34] The dementia paralytica group demonstrates motor form which,

while it may be disco-ordinated in part, becomes so organized as to carry out general orderly movements. This is shown in their ability to bowl and in 40 patients' bowling tournaments participated in by the praecox group, manic depressives and the dementia paralytica group, 22 of the latter type gained first or second place bowling on an average of 108 in duck pins and 142 in ten pins. Faulty social and motor reactions may also be due to disease of a characteristic periodic nature such as manic depressive psychosis or by the lowered and retarded activity brought on by such a disease as encephalitis lethargica.

Ascendency of phantasy may also be the cause of faulty reaction. Incomplete reaction may be due also to what Freud calls "the divided personality."

There may also be interposition of obsessions, delusions, or hallucinations which break in between the stimuli and the completed act.

CONSTITUTIONAL TYPES AND RE-SOCIALIZATION

Evidence by Krapelin, Kretchmere, and later the critical study by Laura Polen, seems to confirm a causal relationship between constitutional types and susceptibility to social stimuli. The middle height, soft, short pyknic types are thought to be of the manic depressive or circular type of reaction. The lean, slender, asthenic types are thought to be more liable to schizophrenic reactions.[35] [36] [37] So far as I know, there has been no study which discusses the possible relationship between physical structure and re-socialization. This will undoubtedly prove an interesting study. Marbe, in Germany, made extensive investigations along the line of the relationship of psycho-physical organism and personality. He believes from these studies that there is a causal relationship between social status and Kretchmere's constitutional types.[38]

SUMMARY

Physical education is a distinctive agency in the modern program of re-socialization for the mentally ill. Exercises, to be effective, must be highly diversified and selected carefully with reference to the patient's emotional, volitional, intellective, and perceptive capacity.

The efficacy of games in the re-socialization of the psychotic patient is partially explained by the following:

A.

1. The impressions are definite and simple and thus are able to penetrate the patient's attentive field.

2. A highly diversified program of physical education attacks patient's withdrawal from society.

3. Games provide social media which are acceptable to the patient's various social levels.

4. Games enable the therapist to establish valuable natural control situations in which potential re-socializing capacity is naturally aroused.

5. Games enable the therapist to utilize reflex instinctive and emotional acts in their normal place as primary performances leading to voluntary acts as secondary performances.

6. The utilization of games enables the therapist to emphasize types rather than disease entities.

7. The criteria of mental illness is social incapacity. Physical education is effective in this field because it attacks this basic condition.

8. In the rehabilitation of the mentally ill, the essential objective is not education or socialization but the re-establishment of capacity and attitudes which have been inhibited, distorted, or temporarily lost to consciousness due to mental disorder. The problem is thus essentially an attempt toward re-socialization and re-education. Games arouse old habit patterns and are, therefore, of re-socializing value.

9. Play has a distinctive appeal to the mentally ill and will stimulate them oftentimes when other agencies fail.

10. As compared to work, play being instinctive, is more natural and more spontaneous.

11. To produce desirable social reactions which will be of value in the field of re-socialization, activities must be varied. Physical education presents a highly diversified program based on sound psychological criteria.

B.

1. The psychotic patient must be studied from the standpoint of his whole personality and a study made of his early play interests in order to induct him into suitable forms of exercise.

2. The initial participation of the psychotic patient must be carefully studied so as to provide against his counter efforts in favor of his coveted individualistic make-up.

3. The resocializing effects of a highly diversified program of physical education should be considered in their relationship to an enlargement of the patient's interests—the ideal progression is from play to work.

4. Physical education must be viewed in its broad relation as a media of re-education in the patient's social attitudes which may result in his breaking away from autistic thinking and acting into the primary stages of resocialization.

5. A progressive retardation of physical and mental processes is characteristic of a large portion of the mentally ill. Physical education, by attacking his basic condition through natural and spontaneous methods, often produces a more active, and in many cases, a more social individual.

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The Effect of Exercise on Heart Rate

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PART I

The Problem.—The object of this experiment was not an attempt to prove anything, but rather an effort to determine:

(1) The effect of several types of exercise on the heart rate.

(2) The effect produced by subsequent rest periods following these types of activity.

(3) The fluctuation in pulse rate during a gymnasium period.

The Group.—The group consisted of twenty-six young women, first-year normal school students. The average age of the group was eighteen years, eight months. The youngest was sixteen years, eleven months; the oldest twenty-one years, one month. These students may all be classed as healthy individuals. They had been examined on several occasions by the staff physician, Dr. Muriel Ramsey, who keeps in constant touch with the students.

Method of Procedure.—The students reported and were carefully instructed in regard to the procedure. At the command "go" they took their own pulse rate for one minute preceding the activity and recorded it on a card furnished for the occasion. They then marched around the gymnasium in simple formations for a period of five minutes at the rate of approximately one hundred twenty-five steps per minute. After a lapse of five minutes the command "stop" was given and immediately they counted their pulse rates for one minute and again recorded them. Then followed an additional five-minute rest period on the gymnasium floor in a sitting position. The last minute of these additional five minutes was consumed in counting the pulse rate preparatory to participation in the next form of activity. This method was continued for each type of activity throughout the balance of the gymnasium period. Thus, we have five-minute exercise periods followed by six-minute rest periods.

The Lesson Content.—The types of exercise were marching, free exercise, a dance, and a game. A brief detail of what was included under each type of activity follows:

1. Marching: The students marched in both rank and column formations. The exercises included, marking time, marching forward, backward, to the rear, and squads right and left in various combinations, not memorized but executed continuously upon command.

2. Free Exercises (Calisthenics or Setting-Up Exercises): These exercises of the formal type were done in rhythm and included arm, trunk, and leg movements in combination. Two-movement exercises were begun from an assumed starting posi-

tion and some four-movement exercises from the fundamental standing position. Exercises were executed both right and left.

3. Dance: This was a clown dance similar to those found in many monographs. The rhythm was schottische and the dance was composed of skip, gallop, and hop steps. Although the dance was familiar to the students, each step was practiced first and then the complete dance (of five figures) danced through.

4. Game: This was a variety of tag game called "Poison." The members of the group joined hands and formed a circle concentric to a smaller circle on the gymnasium floor. This smaller circle bounded the "poison area." The students attempted through pulling in various directions to "poison" anyone of the group by causing her to step in this area. When this happened the group called out "poison" and immediately scattered anywhere in the gymnasium to avoid being tagged (poisoned). The game continued until the one poisoned tagged any others and they in turn joined in the tagging until all were poisoned, when they again joined hands and began another game.

The activities were all previously known to the students.

Discussion.—Some objection might be raised for the reason that one activity followed another. But in view of the fact that many types of activity are employed during an exercise period, it was thought justifiable to conduct this experiment in the manner outlined, to observe the fluctuation rate during a forty-minute period. It is common practice to begin the exercise period with a moderate form of activity as a sort of "warming-up" process.

I am not unmindful of the fact that one of the criticisms that might be offered in regard to the procedure as it has been followed in this particular experiment will be in reference to the exact description of each exercise participated in by this group; another would be the number of repetitions of each exercise; and a third, the degree of vigor exerted by the individual or the group in the execution of these activities. I believe the nature of this experiment as explained by Experiment II will eliminate to a large extent these criticisms. I will agree that if I had based my conclusions only on Experiment I both the type of individual and the activity would have demanded a fuller explanation.

Data.—Table I gives the original data.

Table II presents the summary of this data.

Diagram I shows the curves of distribution.

Results.—First: the pulse at the end of the six-minute rest period following each activity was higher than that at the beginning of the activity. This shows that a greater rest period is necessary for the pulse to return to normal.

Second: the more strenuous the activity, the greater is the increase in the pulse rate and the longer, evidently, is the period for the return of the pulse rate to normal.

Third: the activities showed increases in the pulse rate in the following order from highest to lowest: dance, 33.73 beats; game, 21.54 beats; free exercise, 17.73 beats; marching, 12.84 beats.

Previous Findings.—Pembrey 1909—"Pulse rate may remain above

normal for an hour or more"—Case L. Rest, 68; mile run, 164; hour later, 82.

Martin, Gruber, and Lanman (1914) also found that, although the pulse rate rapidly decreased after exercise, it did not return to normal for more than an hour.

Similar results were found by Benedict and Cathart 1913. The pulse rate fell rapidly at first but remained sometimes for several hours at a distinctly higher rate than before exercise.

TABLE 1

ORIGINAL DATA OF EXPERIMENT NO. I.

STUDENT NO.	MARCHING			FREE EXERCISE			DANCE			GAME			AGE YEARS & MONTHS
	Before	After	Diff.	Before	After	Diff.	Before	After	Diff.	Before	After	Diff.	
1	69	84	15	69	87	18	73	112	39	94	115	21	18–10
2	70	86	16	84	93	9	75	118	43	84	117	33	18–10
3	70	84	14	77	98	21	84	118	34	95	90	–5	18– 7
4	72	96	24	82	89	7	82	100	18	81	95	14	17– 4
5	73	88	15	80	91	11	83	110	27	93	90	–3	18– 5
6	76	83	7	77	85	8	80	94	14	75	99	24	18
7	82	92	10	80	99	19	80	104	24	83	110	27	18– 3
8	82	91	9	81	104	23	82	120	38	82	107	25	18– 7
9	83	90	7	73	96	23	73	120	47	96	115	19	19–10
10	84	90	6	83	88	5	84	120	36	89	114	25	20–11
11	85	98	13	87	105	18	90	130	40	100	146	46	18– 7
12	85	104	19	82	91	9	85	111	26	84	101	17	20– 2
13	85	96	11	86	126	40	89	140	51	95	137	42	20– 4
14	85	89	4	84	98	14	87	105	18	90	100	10	18
15	87	92	5	90	95	5	85	127	42	85	135	50	19– 1
16	87	98	11	80	101	21	90	122	32	100	107	7	19– 4
17	88	94	6	90	120	30	100	140	40	101	135	34	17–11
18	90	110	20	95	120	25	85	130	45	90	125	35	21– 1
19	90	115	25	105	115	10	94	135	41	108	131	23	19– 4
20	90	106	16	90	116	26	94	135	41	108	121	13	18
21	92	99	7	88	108	20	87	134	47	98	123	25	16–11
22	92	98	6	96	101	5	95	108	13	101	102	1	18–10
23	93	111	18	93	134	41	109	138	29	112	135	23	18– 8
24	97	108	11	98	109	11	99	128	29	111	129	18	18– 4
25	98	120	22	97	116	19	99	129	30	110	127	17	18– 7
26	101	118	17	100	123	23	105	138	33	116	135	19	18– 1

The first column under each activity states the pulse rate before participation in that activity. In the second column we find the pulse rate immediately after the cessation of the activity and in column three we find the increase in pulse rate caused by participation in that activity.

TABLE 2

MEANS OF THE ORIGINAL DATA FOR COMPARISON

	Before	After	Difference
Marching	84.84	97.68	12.84
Free Ex.	86.42	104.15	17.73
Dance	88.03	121.76	33.73
Game	95.42	116.96	21.54

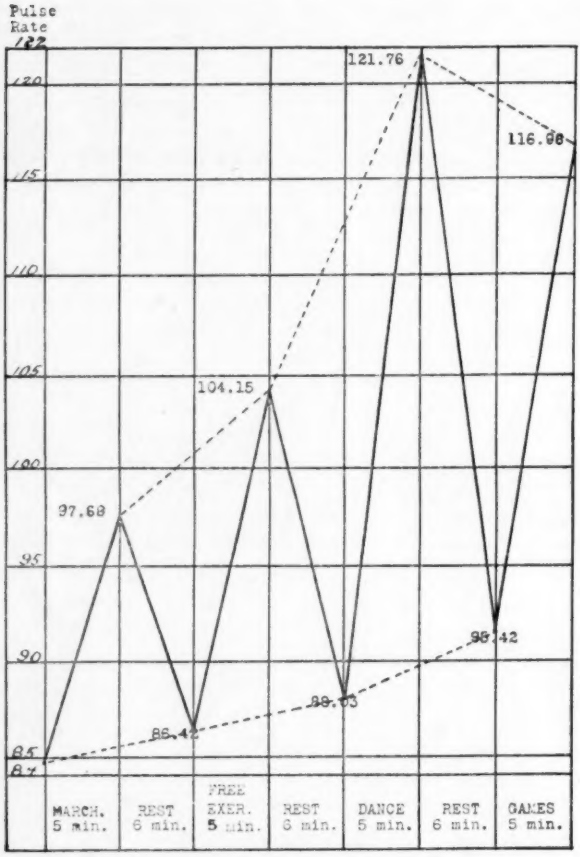

DIAGRAM I. CURVES OF DISTRIBUTION OF EXPERIMENT I

Upper broken line shows exercise peaks. Lower broken line shows return after rest period.

PART II

Introduction.—At the suggestion of Dr. Joseph B. Wolffe, Specialist in Cardio-Vascular Diseases, Temple University Hospital, a similar experiment with the same group was made under the same conditions but with a change in the order of the several activities. These results are presented in the second part of this paper.

The Purpose.—The purpose of this Experiment II was to supplement Experiment I by giving the students exactly the same activities which had been given before but in a different order.

Since one activity followed another after brief intervals of rest the following question was asked: "What would be the result of these exercises upon the heart rate if we changed them about?" I decided to make an attempt to answer this question.

Method of Procedure.—On this occasion twenty-five students were submitted to the test. Six of these did not participate in the former experiment and seven who had been tested in the former experiment did not participate in this one. There were, however, nineteen who took part in both tests.

Dr. Ramsey again assisted and the original procedure was followed as closely as possible with the exception of the one change mentioned in the paragraph immediately above.

In this Experiment II we were able to hold the students long enough to get the results of the last rest period. This had been omitted in Experiment I because the students were scheduled to leave for other classes.

Data.—Table III—Original data of Experiment II. Table IV—The means of Table III for comparison. Table V—Relationship between Experiment I and II. Diagram 2—Curves of distribution of Experiment II. Diagram 3—Graphic relationship of Table V.

Results.—First: It is interesting to note that in spite of the fact that the activities were changed about the results are similar to those obtained

TABLE 3
ORIGINAL DATA OF EXPERIMENT NO. II.

	DANCE			GAME			FREE EXERCISE			MARCHING			
	Before	After	Diff.	Before	After	Diff.	Before	After	Diff.	Before	After	Diff.	PULSE RATE SIX MINUTES AFTER MARCH
1	68	82	14	76	92	16	77	82	5	76	78	2	76
3	83	95	12	78	92	14	79	106	27	80	88	8	89
4	74	86	12	80	88	8	72	81	9	76	84	8	76
5	67	95	28	78	90	12	75	90	15	74	92	18	76
6	79	89	10	78	104	26	82	89	7	82	90	8	82
8	78	115	37	86	121	35	74	102	28	72	85	13	82
9	68	100	32	82	111	29	89	102	13	82	94	12	88
10	78	94	16	86	107	21	88	99	11	80	97	17	90
13	84	130	46	102	122	20	103	128	25	99	124	25	100
14	86	121	35	99	118	19	101	117	16	98	113	15	92
15	83	95	12	89	99	10	88	98	10	92	113	21	100
16	90	109	19	99	110	11	104	115	11	100	110	10	108
17	83	129	46	109	130	21	104	133	29	99	122	23	92
18	86	125	39	103	120	17	95	105	10	90	110	20	90
19	90	103	13	96	113	17	95	111	16	94	114	20	98
20	98	153	55	106	150	44	106	117	11	109	126	17	108
21	82	116	34	97	113	16	98	117	19	96	92	−4	94
23	97	121	24	84	90	6	94	116	22	106	103	−3	100
25	91	109	18	85	100	15	92	94	2	85	101	16	88
*27	88	110	22	85	114	29	87	114	27	72	103	31	84
*28	96	106	10	101	105	4	102	129	27	108	114	6	96
*29	94	115	21	96	111	15	100	113	13	95	110	15	108
*30	101	135	34	110	125	15	110	122	12	107	116	9	98
*31	90	128	38	109	138	29	107	112	5	99	112	13	94
*32	80	99	19	84	108	24	88	96	8	84	97	13	80

*These six students did not participate in Experiment No. I. Seven of the students in Experiment No. I did not take part in this one.

in Experiment I. See Diagram No. 3. The dance again showed the greatest increase in heart rate and then followed the game, free exercise, and marching in receding order.

Second: It is also to be noticed that the mean pulse rates of the group before the first and second experiments were 84.84 and 84.56 respectively, showing a difference at the start of only .28 beats.

Third: Six minutes after the end of the entire exercise periods in Experiment II the average pulse rate was only seven beats faster than it was before the beginning of the same period.

Conclusions.—One thing that was noticeable to us and of which the students were especially aware was the distress they experienced when the dance was given first. In spite of this fact the recorded heart rate was

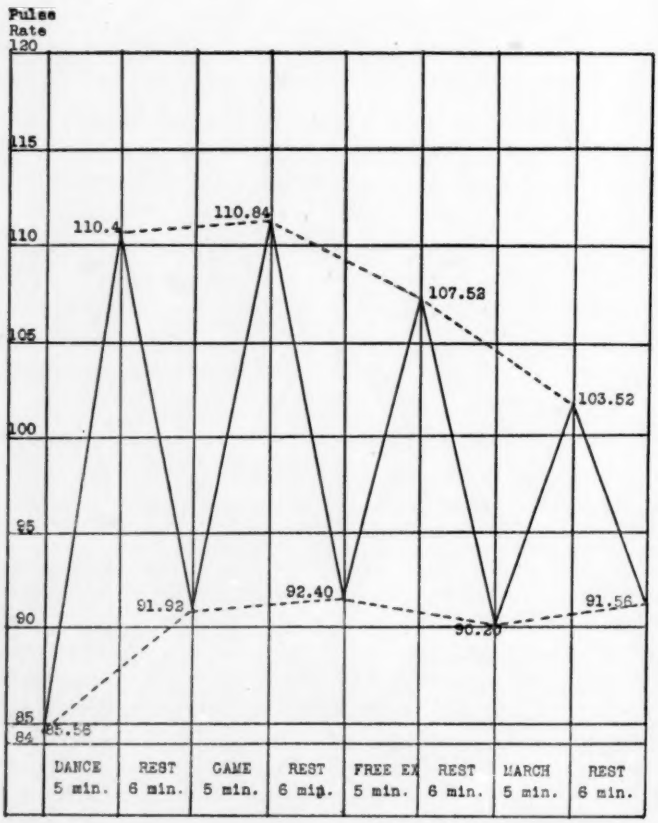

DIAGRAM II. CURVES OF DISTRIBUTION OF EXPERIMENT II.

Upper broken line shows exercise peaks. Lower broken line shows return after rest period.

lower than when the dance had been preceded by more moderate forms of exercise.

Probably this distress was brought about by the immediate demand that this vigorous type of exercise made upon the body. The more moderate approach permits a gradual metabolic adjustment.

Evidently lighter forms of exercise should precede the more strenuous forms and frequent rest periods during exercise are paramount for the good of the individual.

TABLE 4

SHOWS THE MEANS OF ABOVE TABLE FOR COMPARISON

	Before	After	Difference
Dance	84.56	110.40	25.84
Game	91.92	110.84	18.92
Free Ex.	92.40	107.52	15.12
Marching	90.20	103.52	13.32

TABLE 5

A COMPARISON OF THE RESULTS OF BOTH EXPERIMENTS

EXPERIMENT	DANCE	GAME	FREE EXERCISE	MARCH
Number I.....	33.73	21.54	17.73	12.84
Number II.....	25.84	18.92	15.12	13.32
Means.....	29.78	20.23	16.42	13.08

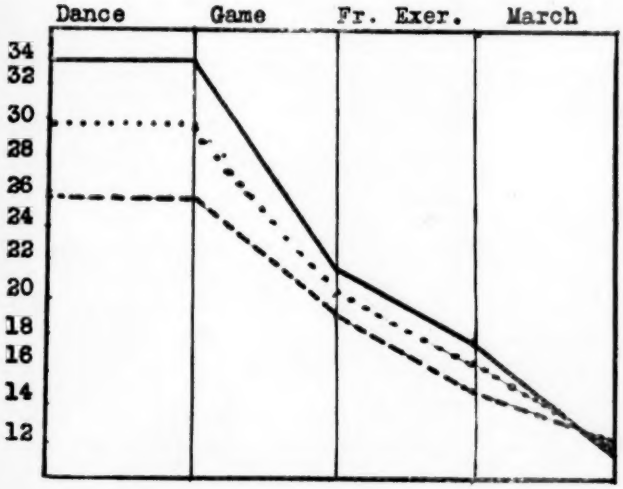

DIAGRAM III. CURVES BASED ON THE RESULTS SHOWN IN TABLE V.

————Experiment I.
- - - - - -Experiment II.
.....Means of results of both experiments.

The figures indicate the increase in pulse rate for each activity in both Table 5 and Diagram III.

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Information Tests in Health and Physical Education for High School Boys

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I. THE PROBLEM AND PURPOSE

THE learning imparted to school children may be said to relate to practices, attitudes, and information. In the field of health and physical education there has been little done in the testing of information. Since this phase of the educational program has developed and has been recognized in the program of studies of the modern high school there is a felt need for standard tests in measuring the results of the work here as in other divisions of the program of education.

The primary aims of this study* are: to develop and standardize information tests on methods and technics of some phases of the high school physical education program for boys; to establish tentative grade norms for the eighth, ninth, tenth, and eleventh grades, and the statistical reliability of these norms; to determine the approximate reliability of each test. The secondary aims are: to determine the best method of classification by grades for high school classes in physical education on the basis of the data from these tests; to interpret the statistical results of the administration of these tests; to draw such conclusions about the present program of health and physical education as the data warrants.

The phases of the physical education program included are:

1. Major athletic activities (baseball, football, basketball)
2. Minor sports(soccer, tennis, handball, volleyball)
3. Health related to physical education
4. Self-defense (boxing and wrestling)
5. Recreational sports (golf, hiking, fishing and hunting, swimming, boating and canoeing, riding and horsemanship, camping and picnicking, horseshoes).

The above division is purely arbitrary.

II. SELECTION OF TEST MATERIAL

New type examinations were chosen because they are generally accepted as being objective, reliable, and easily scored, and as lending themselves readily to statistical treatment.[1]

True-false items were adopted where the field of information was very large and widespread, in an effort more nearly to test the many phases of

*Digest of a Masters Thesis, University of Texas, August, 1931.

[1] G. M. Ruch and G. D. Stoddard. *Tests and Measurements in High School Instruction.* (New York, 1927) Chap. 1.

each activity. Multiple-choice (five-choice) items were used where the activity was considered to be more limited or the field had been tested more thoroughly before as in health.

Other types of tests that might be used are: (1) matching, (2) completion, (3) best answer, (4) four-choice. The information included in the tests should lend itself readily to these other forms, and statistically, no radical deviation[2] from the results of the present forms should be expected.

The material for the tests was taken from the following sources:

1. Tests of information in health and physical education that have been used previously.

Tests prepared by Dr. D. K. Brace for use in his classes of physical education, tests prepared by Dr. D. K. Brace and Miss J. Pinckney for use with college freshmen,[3] and the Gates-Strang Health Knowledge Tests which were used as a guide in securing general information for the test items.

2. Statements of leading authorities who have written books on the activities.

In order to show more evidence for the validity of the selection of the items on the basis of the space devoted to them in books, the ratings as to the importance of the technics and methods of football were made by experts and coaches in the field, and these averages were correlated with the average number of pages devoted by each of several leading authors to the same methods and technics. The rank-order method of correlation was used.[4] Table I shows the results of the treatment.

III. THE CRITERIA AND PROCEDURE

The criteria and procedure used in preparing the preliminary tests and the basis for selecting the items of the final test forms are explained in the following paragraphs.

Steps in constructing an objective test:

1. Drawing up a table of specifications.
2. Drafting the items in preliminary form.
3. Deciding upon the scope.
4. Editing and selecting the final items.
5. Rating the items for difficulty.
6. Breaking the items into alternate forms.
7. Rearranging the items in order of their difficulty.
8. Preparing the instructions for the test.
9. Making the answer keys or stencils.
10. Deciding upon the rules for scoring.[5]

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[2] *Ibid.*, p. 33.

[3] Some of these tests have not been published.

[4] H. E. Garrett, *Statistics in Psychology and Education*, (New York: Longmans, Green & Company, 1926) p. 190.

[5] G. M. Ruch, *New Objective Examinations*, (New York: World Book Co., 1930) p. 149.

TABLE I

CORRELATION OF JUDGMENTS BY EXPERTS WITH NUMBER OF PAGES OF TEXTS

Technics and Methods	Average Rank by experts	Average Rank by pages	D	D^2
Offense	2	1	1	1
Position play	6	2	4	16
Defense	4	3	1	1
Tactics	5	4	1	1
Kicking	11	5	6	36
Blocking	1	6	5	25
Tackling	3	7	4	16
Passing	9.5	8	1.5	2.25
Stance	8	9	1	1
Catching	7	10	3	9
Carrying the ball	9.5	11	1.5	2.25
Starting and running	12	12	0	0
Falling on the ball	13	13	0	0
				$\Sigma D^2 = 110.50$

$$\rho = \frac{6D^2}{N(N-1)} = 1 - \frac{663}{13(168)} = 1 - \frac{663}{2184} = 1 - .3035$$

$\rho = .6965$

Correcting this coefficient for attenuation.[4]

Correlation $= r = .7173$

The following is the table of specifications used in selecting the items:

1. Authority for the items:
   a) statements from previous tests
   b) agreement of three authors on the statement
2. Criteria for the statement of the items:[6]
   a) not over twenty words in true-false statements
   b) fewest possible words used in the multiple-choice items
   c) care in the use of English
   d) common English construction
   e) no double negatives
   f) no "trick" or "catch" questions
   g) no two items used so that the answer to one suggests the answer to the other
   h) an equal number of specific determiners in the true and in the false statements
   i) each item an independent unit
   j) as few specific determiners as possible ("never," "always," etc., are usually answered in the same way)
3. Criteria for the arrangement of the items:

[6] *Ibid.*, pp. 149-151.

a) the first items made easy
b) a large number of items representing each phase of the activity
c) a random choice of true-false items
d) no more than six statements in sequence that have the same sign for the correct answer in true-false tests
e) approximately an equal number of true and of false statements
f) items neither extremely hard nor extremely easy

IV. PREPARATION OF PRELIMINARY TESTS

From a large number of items that had been prepared for each activity, those that best fulfilled the criteria were selected for use in the preliminary tests. Following the steps in constructing an objective test as given above the preliminary tests were edited in equal sections, one devoted to technics and the other to methods of play.

These preliminary tests were administered to unselected groups of more than fifty high school boys[7] for each test. The following instructions were given for the administrators of the tests:

Provide a good room or place where boys can write in proper position. Be sure the room has sufficient and correct lighting and ventilation. Provide pencils or pens.

Tell the boys that the tests are to test their information of the skills and methods of their health and physical education activities. Before distributing the tests tell them that none are to start until they are told to "go," or some signal is given. Caution each of them to read the directions carefully and score the test, as in the examples shown at the beginning of each test.

Giving the Test

Call on a few boys to help distribute the tests. Let no one begin until all of them have carefully filled in the blanks in regard to school, age, grade, name, and competition. This should take only a minute. Impress on them the fact that legibility in their writing is important.

After this has been done, have each of them read the instructions and directions for the test and to note the examples. Now they should understand thoroughly. If you think best, you may have the group read the directions with you as you read them aloud. Remind them to score each item.

Ask for any questions that they wish to ask in regard to their procedure in taking the test. No questions should be answered in regard to the subject matter covered in the test nor the interpretation of the items. Tell the boys to read the statements through thoroughly and to answer to the best of their ability. Tell them that no questions will be answered during the time they are taking the test except as regards typographical errors or like mistakes. Stress the point of doing their own work and of doing their best. They need not worry about trying to get them all scored right since that is hardly to be expected in any case. Just remind them to do the best they can.

During the test, if a typographical correction or some such change be necessary, have all the boys make the same change in all their papers so all will have the same advantage.

General Points

Collect the papers when the test is through and put them away from the pupils.

To encourage the boys to do their best, the examiner may make use of the scores

[7] From seven medium-sized high schools in towns of 5,000 to 50,000 inhabitants.

in giving marks in physical education or may use some similar scheme. As part of a regular testing program such procedure should be beneficial.

It is necessary to keep the tests under lock and key if making use of the tests without allowing coaching to enter is a factor. This is especially necessary if the same questions are to be used in tests given the following year.

Once the foregoing procedure has been established, the tests that follow later will be understood by the boys and much less explanation will be necessary.

Answer keys were constructed and used in scoring the tests.

The formula that was adopted for scoring the tests is: S=R(score = number of items marked correctly)[8]

V. METHOD OF REVISION OF THE PRELIMINARY TESTS

The final form of the tests was found by experimentally validating the individual test items. The following steps were used to eliminate poor items:

1. Give the test
2. Score the tests and arrange the test papers in order of size of score

TABLE II

TABULATIONS OF CHARACTERISTIC STATEMENTS FROM THE PRELIMINARY BASEBALL TECHNIC TEST ITEMS

Item No.	Signs	Correct sign	Distribution by total score groups				
			35–40	40–45	45–50	50–55	55—
17*	+	wrong	6	7	8	4	1
	o	right	3	13	4	6	2
20	+	right	7	15	9	9	3
	o	wrong	2	5	3	2	o
27*	—	right	6	9	7	4	2
	o	wrong	3	11	5	7	1
46	—	right	4	15	11	10	3
	o	wrong	5	5	1	o	o
47*	—	right	1	2	2	1	o
	o	wrong	8	18	11	19	13
52	—	wrong	5	8	5	3	o
	o	right	4	12	7	7	3
53*	—	right	5	18	11	10	3
	o	wrong	4	2	1	o	o
59	—	wrong	7	6	3	2	o
	o	right	2	14	9	8	3
67*	—	wrong	6	12	8	8	3
	o	right	3	7	4	2	o
72	—	right	4	11	10	10	3
	o	wrong	5	9	2	o	o
73	—	right	3	4	4	8	2
	o	wrong	6	16	8	2	1

*Not used in final test. Obviously these are poor items.

[8] For a full discussion of this procedure see G. M. Ruch, *New Objective Examinations*, Chapter II.

3. Divide the papers into convenient groups so as to get at least five groups of scores
4. Tabulate the number of pupils passing or failing each item
5. Study the tabulations for the "poor" groups and the "good" groups
6. Criteria for eliminating items:
   a) items too easy, i. e., do not eliminate 15 per cent of the total group.
   b) items too difficult, i. e., not answered correctly by at least 15 per cent of the total group.
   c) where the "poor score" groups show percentage of success as high or higher than the "good score" groups. The best items will show the largest differences in successes in favor of the groups making higher scores.

The items in the above table were chosen to show characteristic items that were eliminated.

No. 17 tends to show the same percentage of failures among the "high scored" papers as among those with low scores. So does No. 27. These items do not differentiate between high abilities and low abilities.

No. 47 is too difficult. Only six marked it correctly.

No. 53 is too easy. Only seven marked it wrong.

No. 67 shows a higher percentage of those making low scores marking it correctly than of those making high scores.

Each item for all the preliminary tests of this series of tests was validated in the way described above.

Basketball Technics and Methods

\+ 5. During a pivot one foot should be in contact with the floor until the ball is passed.
o 8. The palm of the hand should meet the ball first in catching it.
\+ 16. The faster a man is coming in, the easier the pass to him should be made.
\+ 19. The best players come to meet the passes.
\+ 41. The bounce pass should hit the floor even with the guard's foot.
\+ 49. The palm of the goal-shooter's hand should be horizontal when coming in fast from the front.
o 54. Tall men should stay away from the backboard on the free throw lane when a free throw is being taken.
o 65. The last pass of a tip-off play should be received in the corner of the court.
o 70. The best teams have at least 20 plays to use from tip-off.
o 97. The best teams use the dribble to advance the ball rapidly.

Football Technics and Methods

o 1. Right-handed passers should advance their right foot when throwing passes.
\+ 9. Ball carriers should keep the ball on the side opposite any would-be tackler.
o 10. The defensive ends should play as low as the defensive guards on the same team.
o 17. The place-kicker should keep his eye on the goal while kicking.
\+ 23. Rushing the passer is an aid in pass defense.
\+ 27. A good tackler has a wide base with the body weight low at the instant of contact.
o 49. The defensive fullback should wait for the advancing ball-carrier.

+ 50. The nearer the backfield man is to the line of scrimmage, the easier should be the pass from center.
+ 66. The hands should touch the ball first in catching punts.
o 77. Five offensive men at the most are eligible to receive forward passes.

HEALTH RELATED TO PHYSICAL EDUCATION

1. The most important item of the physical education equipment should be
....sweat shirt
X shoes
....color of the material
....head gear
....arch supports

8. The food of the athlete should be
....different entirely from that of other people
X much the same as that of other people
....almost all meat
....plentiful, without regard to the type of food
....with no sugar

12. Of the following, the most important reason why fruits are healthful is that they
X help to prevent constipation
....are rich in calories
....contain iron
....are cheap
....taste well

33. Boils among players are most often due to
....previous sickness
X unclean equipment
....lack of medicine
....not having sufficient sleep
....impurities in the blood stream

60. If you are in good health, you should
....be able to run a mile in five minutes and not feel tired
....eat everything that you like
....sleep little
....try to reduce
X enter into activities, and feel good all over

MINOR SPORTS

Soccer

o 1. The hands should be used on the ball in making most passes in soccer
+ 8. The goal-tender should stay between the goal and the ball
o 39. When the attackers are coming in close to the goal, the goal-tender should advance to meet the ball

Handball

+ 1. The serve should be made with the open palm
o 26. The best players strike all returns at arm's length
+ 30. A return should generally be so placed that the ball will bounce away from the opponent

Tennis

+ 1. The follow-through should be a part of every serve
o 24. Position on the court should be maintained with one man near the net at the center and the other near the center of the baseline (doubles)
o 33. The best servers crouch when making the serve

Volleyball

o 6. The server should use a side-arm swing
+ 23. Returns should be made to the opponents' backcourt
o 31. All the team should shift to the side that the serve comes on

SELF-DEFENSE ACTIVITIES

Boxing

1. The left foot should be placed
....slightly behind the right
....even with the right
X in advance of the right
....well behind the right
....cross-stepped over the right
5. When side-stepping to the right, the feet should be moved
....both at once
X right in advance
....left in advance
....left cross-stepped over
....by jumping
26. When the opponent is down, the boxer should
....help him up
....keep fighting
X go to a corner
....lean on the ropes
....sit down

Wrestling

3. The best wrestlers keep the hands and arms
....extended
X in close to the body
....out to the sides
....above the shoulders
....on the mat
10. The object in applying any hold should be to
....cause pain
....break bones
....choke your man
X touch the shoulders of opponent to the mat
....knock the opponent out

RECREATIONAL SPORTS

Hiking

+ 2. The hiker should be careful in selecting the shoes to be worn
o 8. The weight should be transferred from the heel to the toes over the inside of the foot
+ 25. The hiker should take relatively long steps

Golf

+ 3. The wrists should be cocked at the top of the driving stroke
o 27. The mid-iron is best for playing over trees
+ 43. Putting should be practiced more than driving

Fishing and Hunting

+ 1. Every fisherman and hunter should have a license
o 16. When a fish is running out with the hook, the reel should be stopped suddenly
o 37. The pattern for shot should be directly on any fast moving object

Swimming

o 6. The legs should work like scissors in the breast stroke
+ 9. The arm recovery of the crawl stroke should be above the water
o 21. The leg action should be started as soon as the body is well in the water in racing dives

Boating and Canoeing

+ 6. In an accidental turnover, the boys should stay with the boat
o 9. When using locked oars, the boy should face the way the boat is going
+ 11. Using the oar too rapidly on the power stroke is a fault

Riding and Horsemanship

o 1. The best horsemen mount from either side
o 17. An unshod horse should be ridden only on pavement and smooth ground
+ 21. When turning, the free hand should be used to hold

Camping and Picnicking

o 1. Each permanent camp should be made beneath a tree
+ 12. Spring water should be preferred to water from a swift moving stream
o 20. When sleeping in the open, it is best to sleep with the head under the cover

Horseshoes

o 4. The shoe should be grasped in the palm of the pitching hand
+ 7. Every throw should be an attempt to ring the stake
+ 14. The weight should be transferred to the front foot during the pitch

VII. THE METHOD OF RELIABILITY CALCULATION USED IN THE TESTS

The following method of "reliability calculation from one application of a test"[9] was used in determining the reliability of each of the test sections. The procedure used involved correlation of the correct scores of the odd-numbered items with that of the correct scores of the even-numbered items. This coefficient of correlation was then corrected by Brown's formula.[10] The corrected result was taken as the coefficient of reliability for the test.

Since approximate reliability was sought, only 100 random cases over the entire range of scores were used. Had more cases been used, the coefficient should have been higher.[11] The crude score method of correlation calculation was chosen because of its accuracy and convenience.[12] Table III shows a portion of the table on computation of reliability of the baseball test.

The foregoing coefficient (0.63) was then corrected by use of Brown's formula[13] yielding the coefficient of reliability for the test of 0.773.

This coefficient is relatively high considering that only 100 random cases were used in its computation and that a coefficient of 0.8 is considered high enough for mental tests.[14] The above calculation was applied to each of the sections of the tests used in this study to ascertain the coefficient of reliability.

[9] H. E. Garrett, *Statistics in Psychology and Education*, p. 214.
[10] *Ibid.*, p. 271.
[11] *Ibid.*, p. 269.
[12] *Ibid.*, p. 270.
[13] *Ibid.*, p. 271.
[14] *Ibid.*, p. 16

TABLE III

RELIABILITY CALCULATION FOR BASEBALL TEST SCORES

	odd X	even Y	X^2	Y^2	XY
	30	36	900	1,296	1,080
	32	31	1,024	961	992
	29	32	841	1,024	928
	32	28	1,024	784	896
	28	29	784	841	812
	39	36	1,521	1,296	1,404
		Etc., for 100 pairs of scores			
Σ	3505	3543	124,858	128,918	125,823

Formula: $r = \dfrac{\dfrac{\Sigma XY}{N} - \text{av.}X\text{av.}Y}{XY}$; $r = 0.63$

VIII. TREATMENT OF THE DATA FROM THE TESTS

Table IV shows the scores on one test, the baseball test, for each grade distributed by steps of three. This gives a picture of the range and spread, and a condensed form of the data.

Table V shows the tentative grade norms and the probable error and standard deviation for each norm. The probable error of each standard deviation is also included.

Because of its more common usage, the probable error has been selected as the measure of distribution or dispersion. It is used as a measure of reliability of the norms set up from the distributions. A probable error is equal to standard deviation multiplied by .6745.[15]

The probable error of the difference[16] was used to find the reliability between the grade norms.

TABLE IV

DISTRIBUTION OF THE SCORES ON THE BASEBALL TEST

GRADE	Test scores 45 to 47	48 to 50	51 to 53	54 to 56	57 to 59	60 to 62	63 to 65	66 to 68	69 to 71	72 to 74	75 to 77	78 to 80	81 to 83	84 to 86	87 to 89	90 to 92	Total
8	1	1		3	5	7	7	12	6	4	2	2					50
9	1	1	3	1	2	13	11	10	18	21	13	4	5	5	2		110
10				4	3	6	4	8	13	11	13	10	6	10	3		93
11				1	3	2	5	6	7	17	10	5	9	6	4	1	75
															Total		328

The norms in Table V above are the arithmetic means of the distributions in Table IV. The standard deviations and the probable errors show the variability, or "scatter," about the norm.

[15] *Ibid.*, p. 269
[16] *Ibid.*, p. 129.

TABLE V
STANDARD DEVIATION AND NORMS BY GRADES FOR THE BASEBALL TEST

Grades	Norm (av.)	S. D.[17]	S. D. of Av.[18]	P. E. of Av.
8th	65.5	7.12	1.07	.72
9th	70.5	8.265	.984	.66
10th	73.2	9.915	1.03	.69
11th	74.36	8.088	.934	.63

One standard deviation on either side of the norm (72.62 and 58.38 for eighth grade) marks off approximately 67 per cent of the cases, and cases falling much outside 3 standard deviations on each side of the norm may be considered to be reliably different from the average of the groups. No cases in these distributions fall outside 3 standard deviations.

The probable error of the average means that 50 per cent of cases will fall within this limit, that is, 50 per cent of comparable groups of eighth grade boys will have averages between 65.5 + .72 and 65.5 — .72, i. e., between 66.22 and 64.78. There is practical certainty that comparable groups will have averages between 62.62 and 68.38.

INTERPRETATION OF BASEBALL TEST DATA

The distribution of scores in Table IV shows a tendency for each grade group to follow the theoretical "normal" distribution curve. The deviations from it are such as might be expected from any mental test.

The norms set up here are only tentative, but in view of the small number of cases on which they are based, they have relatively high reliability.

The difference of 5 P. E. between the average of the eighth and ninth grade boys is statistically reliable and significant. Any deviation of more than 4 P. E. marks off limits within which the chances are very great—99.7 in 100—that the difference will be greater than zero. That of 5 P. E. here means that the chance of the difference being greater than zero is very large.[18]

CONCLUSIONS FROM THE DATA RELATING TO THE BASEBALL TEST

1. The scores indicate that the test was well adapted to the groups tested.

2. The P. E. of the norms is small, and hence for any comparable group of subjects the average score should be about that found here.

3. The reliability coefficient taken from 100 cases over the range of scores (45-80) is .773. This approaches the required .8 mentioned as a minimum coefficient for acceptable mental tests. Had the number of cases been increased, this coefficient would probably have been greater.

4. The individual deviations from the norms are not abnormal in any case.

[17] H. E. Garrett, *Statistics in Psychology and Education*, p. 145.
[18] *Ibid.*, p. 53.

5. The difference between the norms for eighth and ninth grade boys shows a high reliability. The difference between norms for ninth and tenth grade boys is marked, but less reliable. The difference between norms of the tenth and eleventh grades might be caused by chance.

6. The foregoing conclusions seem to indicate more rapid acquisition of knowledge in the eighth and ninth grades about technics and methods of baseball play.

7. Where baseball classes must be composed of combined grades of boys (this is not recommended, but is the case in most of the schools tested), the data indicate that the tenth and eleventh grade boys would make the most homogeneous group.

The foregoing procedure was followed for each section of the test on each phase of the program that was included in the testing. The statistical treatment, summary of each section, and the interpretation of the results led to the following summary of the whole problem.

IX. SUMMARY

1. The criteria that were set up in this problem develop tests suitable for measuring the knowledge of technics and methods in physical education and health activities.

2. The tests are adapted for use with high school boys.

3. The distribution of the test scores shows a tendency to follow the theoretical "normal" distribution.

4. The tests show high reliability. The coefficients are: Baseball, .773; Basketball, .666; Football, .780; Self-defense, .877; Health, .808; Minor Sports, .847; Recreation, .730.

5. The tentative grade norms are satisfactorily reliable. The following table gives grade norms and their P. E.:

TENTATIVE GRADE NORMS[19]

Test	No. of Items	Grades 6th	7th	8th	9th	10th	11th
Baseball	106	–		65.5 ±.72	70.5 ±.66	73.2 ±.69	74.86 ±.63
Basketball	100	52.43 —.512	58.1 —.678	59.62 ±.502	64.08 ±.917	67.93 ±.769	69.16 ±.83
Football	85	47.2 —.491	46.9 —.56	48.6 ±.54	54.05 ±.607	57.1 ±.58	60.2 ±.715
Self-Defense	60			30.85 ±.40	33.00 ±.46	34.4 ±.54	35.5 ±.71
Health	60			33.02 ±.429	37.54 ±.387	39.01 ±.422	43.08 ±.315
Minor Sports	130			70.85 ±.748	77.4 ±.850	81.87 ±.715	81.90 ±.944
Recreational Sports	210			123.5 ±1.16	132.2 ±1.21	130.21 ±1.36	137.25 ±1.42

[19] Subject to revision when more data are available.

From the above table of norms, the differences between the norms of eighth and ninth grade boys indicate high reliability in each test. This reliability is expressed as beyond 4 P. E. of the difference of the averages in each test besides the one on Health. Here it is 3.53 P. E. of the difference.

Several explanations of this feature might be offered. A plateau of learning may be reached in the ninth and tenth and eleventh grades.

Perhaps the limit of mental development is reached about the ninth grade. It may be that the teaching is more efficient for the ninth grade boys. Again, it is probable that the tests are not sensitive to the same degree for the higher grades.

This finding offers opportunities for further research. Most of the possible explanations are based on the hypothesis that these tests will correlate highly with intelligence tests. The items could also be treated for their sensitivity for each grade.

A further study of the above table shows that the least variable differences appear between the tenth and eleventh grade norms on all the tests except those of Health and of Recreational Sports. This fact indicates that for homogeneous grouping in physical education classes where different grades must be combined that the tenth and eleventh grade boys should be classified together.

The highly reliable differences between grade norms for the health test indicates that the information tested may come from other courses of the high school program. Presumably the items of this test are more sensitive to the higher grades.

6. The method of revision used in eliminating the poor items of the preliminary tests improves the tests.

7. There is a lack of printed material relating to technics and methods on self-defense, minor sports, and recreational sports.

8. The method and procedure of administering and scoring and the statistical treatment used in this series of tests is such as to establish satisfactorily the standardization of these tests.

X. PRACTICAL APPLICATION OF THE TESTS

Often it becomes necessary to make a general survey of teaching efficiency. This series of tests should prove valuable in determining teaching efficiency through testing the information imparted to the pupils.

In making comparisons between school systems, such tests as this series affords an objective basis for comparison. This is equally true for comparisons made within the same system.

Studies of pupil progress demand tests that have high degrees of reliability and objectivity. The present tests should be valuable in showing objectively the progress of pupils.

The comparison of individual pupils with norms of average performance necessitates reliable norms and other factors, such as mental age

and chronological age. The present tentative grade norms should be verified or corrected by added cases for such comparisons.

In diagnosing special difficulties, this series of tests should be of use. For instance, in a school system some schools seem to have very little work on minor sports. Objective evidence is needed in making such a diagnosis. The tests might be of value in determining the weaknesses of a team playing baseball or of an individual player.

The practical application for giving marks, promotion, and sectioning of classes is obvious.

The uses of tests in experimental ways are manifold. Many problems have been suggested for the use of this series while preparing the same. Some of these are:

1. Correlation with mental tests.
2. Correlation of test scores with coaches' ratings of players.
3. Correlation of skill achievement with achievement on the information.
4. Case studies of game information among high school boys.
5. A study of boys' favorite games. Such a study would investigate the frequency selection of games, whether they know more about this game than other games, reasons for the choice of the games, and whether the game could be played throughout life.

The Factors in the Required Physical Education Program That Are Least Attractive to the College Girl

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CHAPTER I

INTRODUCTION

GRANTED that physical education programs in colleges have been reorganized to include opportunities for establishing habits of skill in fundamental and recreational activities, we must admit that there are still factors present that are working against the satisfactions and services inherent in the type of programs offered.

In view of the presence of these factors, this study was undertaken to secure data on the trend in unfavorable attitudes of college girls in regard to the required physical education programs. These data may be of reference value to directors of physical education who are interested in providing opportunities for the development of appreciations and attitudes toward physical activity that will favor its continuance beyond college years.

Three schools representing different parts of the country were chosen for the study; the State Teachers College in Montclair, New Jersey, the State Teachers College in Warrensburg, Missouri, and the Washington State Normal School in Ellensburg, Washington. From the point of view of a field study, the data are reliable in indicating trends rather than definite conclusions. The constant factors in the study are: (a) the year and months in which the blanks were checked; (b) blanks on which the statements were checked; (c) the size of student groups checking the blanks; (d) all situations are teacher-training institutions; (e) physical education majors were excluded from checking the blanks.

Twenty-three factors that were suspected to be unfavorable influences were collected from college friends and experienced teachers of physical education. A checking sheet was devised on which the factors were listed, and students were asked to check them in order of appeal.

Using this checking sheet, a preliminary study was made of the reactions of fifty students of Barnard College, Columbia University. On the basis of this study, two more factors were added to the checking sheet. The sheet was then sent to Montclair, Ellensburg, and Warrensburg to be checked by one hundred students in each school. A copy of this checking sheet is presented here.

BLANK OF INQUIRY

Purpose of the study.—To secure data on the trend in unfavorable attitudes of college girls in regard to the required physical education program.

Directions for checking this sheet.—Granted that there are influences that help to establish favorable and unfavorable attitudes toward physical education—of the following *unfavorable* influences, check the five that you think are most significant.

Place *1* beside the factor that you consider most important. Place *2* beside the next most important factor, and *3* beside the third factor of weight. Place *4* and *5* beside the next two significant factors.

If you think of other unfavorable influences that you consider more important than those listed, number in order of importance and place them at the bottom of the paper.

Factors to be checked:

1. Failure of the secondary schools to develop elementary physical skills beyond the novice stage.
2. Lack of student knowledge regarding content of the physical education program.
3. Antagonistic feeling toward the required program which is a carry-over from high school experience.
4. Required to participate in activities in which not interested.
5. Dislike of physical education activity in any form.
6. Trend of academic thinking disturbed by physical activity during school hours.
7. Time allotment for each activity too short to develop skill in any one activity.
8. Different degrees of skill in one class.
9. Class too large.
10. Uncongenial atmosphere in class.
11. Gymnasium or pool not conveniently located in regard to other classes.
12. Dislike of the required costume.
13. Inconvenience of dressing and undressing.
14. Not time enough for dressing, with resultant feeling of untidiness.
15. Locker rooms not conveniently arranged.
16. Showers with central control.
17. Cold shower rooms.
18. Hair arrangement disturbed, especially in regard to swimming.
19. Cosmetics not available for make-up after shower.
20. Little opportunity in the activity program for student leadership experience.
21. Time of day at which physical education is scheduled.
22. Personality of teacher not appealing.
23. Inability of teacher to get material over to students in class.
24. Required physical education without academic credit.
25. Lack of time due to outside employment.

CHAPTER II

INTERPRETATION OF DATA

One hundred checking sheets were returned from each of the three schools, but in a few instances all five places were not checked, with a resulting very slight difference in the total reasons checked for each school.

Frequency tables were made for each school as the basis for ranking the factors of most importance. This rank order of factors is presented in Tables I, II, and III. The ten factors appearing most often are dis-

cussed in relation to their appearance in the scale, in their relation to each other, and to the questions that they raise. Percentages are given for the first ten factors in each table, showing the importance given to a single factor in relation to the whole situation.

A composite ranking of the three schools is given in Table IV, which is then compared with the ranking from Barnard College, on a percentage basis.

Some strikingly similar results are shown in the following tables; results, which because of the limitations of this study, raise questions rather than point toward definite conclusions.

TABLE I

RANK ORDER OF FACTORS IN MONTCLAIR

	Number	Per Cent
Inconvenience of dressing and undressing	79	16
Not time enough for dressing, with resultant feeling of untidiness	72	14
Required to participate in activities in which not interested	57	11
Failure of the secondary schools to develop elementary physical skills beyond the novice stage	44	9
Time allotment too short for each activity to develop skill in any one activity	44	9
Different degrees of skill in one class	42	8
Antagonistic feeling toward the required program—a carry-over from high school experience	33	7
Time of day at which physical education is scheduled	19	4
Locker rooms not conveniently arranged	16	4
Trend of academic thinking disturbed by physical activity during school hours	11	2
Required physical education without academic credit	10	
Uncongenial atmosphere in class	6	
Hair arrangement disturbed, especially in regard to swimming	6	
Little opportunity in the activity program for student leadership experience	6	
Personality of teacher not appealing	6	
Written tests in physical education with grade given	5	
Lack of swimming pool	5	
Dislike of physical activity in any form	5	
Cold shower rooms	5	
Lack of time due to outside employment	3	
Lack of student knowledge regarding content of the physical education program	3	
Class too large	2	
Dislike of the required costume	1	
Showers with central control	1	
Gymnasium or pool not conveniently located in regard to other classes	—	
Cosmetics not available for make-up after shower	—	
Inability of teachers to get material over to students in class	—	
Total	481	

Table I shows the distribution of unfavorable influences as checked by the students in Montclair. *Inconvenience of dressing and undressing* ranks first with seventy-nine checks, representing 16 per cent of the influences that help to establish unfavorable attitudes in Montclair. This may be a result of the second ranking factor, *not time enough for dressing,*

with resultant feeling of untidiness; or it may stand alone simply as an inconvenience. Taken together, these two factors represent 20 per cent of the total number of times the influences were checked.

Checked fifty-seven times, *required to participate in activities in which not interested* appears as the third item of importance, tending to indicate the existence of one or more of the following conditions: a narrow student range of activity interests, choice in activities administratively restricted, or a limited variety of activities offered. *Failure of the secondary schools to develop elementary physical skills beyond the novice stage,* checked forty-four times and ranking fourth in student opinion, may be a contributing cause to the lack of interest in required activities. We tend to enjoy most those things which we do best. Therefore, if fundamental skills are not developed in elementary and secondary schools, college students cannot be expected to show much interest in activities that require these skills.

It will be noted that *time allotment for each activity too short to develop skill in any one activity* is checked forty-four times, pointing to dissatisfaction on the part of students with the amount of skill in activity that is being developed. Is the time allotment too short because part of the instruction period must be spent on developing elementary skills that were not developed in the lower schools? Unfortunately the scope of this study does not include such an interesting investigation, but does point toward further study along this line.

One is inclined to think that failure to develop elementary physical skills in the lower schools may also be a contributing cause to the high ranking given the next two factors, *different degrees of skill in one class,* checked forty-two times, and *antagonistic feeling toward the required program which is a carry-over from high school experience,* checked thirty-three times.

Time of day, with nineteen checks, seems to be an individual problem. The hours to which the students object are scattered throughout the day, indicating that the objection is largely caused by personal inconvenience.

Trend of academic thinking disturbed by physical activity during school hours, checked eleven times, is again an individual problem. Not everyone is so affected by exercise, but the fact that it is checked eleven times is significant enough to rate it as one of the ten most frequent influences working against the establishment of desirable attitudes toward activity.

Locker rooms not conveniently arranged, checked sixteen times, is an administrative problem that carries within it the possibility of improvement.

While representing only 10 per cent of the total rating of Table II as compared with 30 per cent of the total of Table I, *not time enough for dressing, with resultant feeling of untidiness* and *inconvenience of dressing and undressing* are again checked as the most frequent influences reacting

TABLE II

RANK ORDER OF FACTORS IN ELLENSBURG

	Number	Per Cent
Not time enough for dressing, with resultant feeling of untidiness	49	10
Inconvenience of dressing and undressing	48	10
Different degrees of skill in one class	45	9
Failure of secondary schools to develop elementary physical skills beyond the novice stage	44	8
Required to participate in activities in which not interested	42	8
Time allotment too short for each activity to develop skill in any one activity	38	7
Antagonistic feeling toward the required program—a carry-over from high school experience	33	6
Lack of time due to outside employment	32	6
Lack of student knowledge regarding content of the physical education program	30	6
Class too large	21	4
Time of day at which physical education is scheduled	14	
Gymnasium or pool not conveniently located in regard to other classes	13	
Hair arrangement disturbed, especially in regard to swimming	12	
Personality of teacher not appealing	11	
Dislike of physical education activity in any form	10	
Cosmetics not available after shower	10	
Little opportunity in the activity program for student leadership experience	8	
Required physical education without academic credit	7	
Inability of teachers to get material over to students	7	
Dislike of the required costume	6	
Cold shower rooms	5	
Uncongenial atmosphere in class	4	
Locker rooms not conveniently arranged	2	
Trend of academic thinking disturbed by physical activity during school hours	2	
Showers with central control	1	
Total	494	

against the establishment of desirable attitudes toward physical activity. What is their relationship to the problem as a whole, and is there a casual relationship between them?

Different degrees of skill in one class is checked once more than *failure of the secondary schools to develop elementary physical skills beyond the novice stage,* and only three more times than *required to participate in activities in which not interested.* Again, a question is raised which is beyond the scope of this study—what is the relationship, if any, among these three factors?

The very close ranking of the next five factors is interesting in relation to their very similar ranking in Table I. Even though it would be unwise to make any statements on the basis of findings from two schools, the indicated trend is very similar, even though the schools are in opposite parts of the country.

Lack of time due to outside employment is ranked seventh, with thirty-two checks, pointing to a definite problem in this school and affecting students who very likely need the socializing side of the activity program.

Lack of student knowledge regarding content of the physical education program, checked thirty times, is the least discouraging of the ten leading factors, because of the comparative ease with which it may be remedied.

The fact that *class too large* is checked twenty-one times may be partly attributed to the fact that the men and women divide the use of the gymnasium, athletic field, and the tennis courts.

TABLE III

RANK ORDER OF FACTORS IN WARRENSBURG

	Number	Per Cent
Inconvenience of dressing and undressing	54	11
Time allotment too short for each activity to develop skill in any one activity	50	10
Failure of secondary schools to develop elementary physical skills beyond the novice stage	46	9
Class too large	44	8
Required physical education without academic credit	42	8
Not time enough for dressing	34	7
Different degrees of skills in one class	33	7
Lack of time due to outside employment	32	6
Required to participate in activities in which not interested	32	6
Antagonistic feeling toward the required program—a carry-over from high school experience	30	6
Lack of student knowledge regarding content of the physical education program	22	
Locker rooms not conveniently arranged	12	
Time of day at which physical education is scheduled	11	
Dislike of physical education activity in any form	10	
Trend of academic thinking disturbed by physical activity during school hours	9	
Little opportunity in the activity program for leadership experience	7	
Uncongenial atmosphere in class	6	
Hair arrangement disturbed, especially in regard to swimming	4	
Dislike of the required costume	4	
Cosmetics not available after shower	4	
Personality of teacher not appealing	4	
Inability of teacher to get material over to class	2	
Cold shower rooms	—	
Showers with central control	—	
Gymnasium or pool not conveniently located in regard to other classes	—	
Total	492	

In Warrensburg, we find *inconvenience of dressing and undressing* again heading the list, checked fifty-four times and representing 11 per cent of the total checks, with its companion factor in Table I and Table II rated sixth in Table III.

Second ranking is given to *time allotment for each activity too short to develop skill in any one activity,* checked fifty times and representing 10 per cent of the total checks. As *failure of the secondary schools to develop elementary physical skills beyond the novice stage* is a close third in importance, one continued to wonder if much of the instruction

is given over to developing elementary physical skills that should have been learned elsewhere. The feeling that the *class is too large* may also be due to the necessity and the desire for elementary skill instruction rather than advanced group work.

Required physical education without academic credit creates an unfavorable feeling at Warrensburg as evidenced by forty-two checks, representing 8 per cent of the total checks.

Different degrees of skill in one class appears in seventh place, checked thirty-three times, indicating a trend of student dislike of a mixture of skill in one class.

Lack of time due to outside employment, checked thirty-two times, *required to participate in activities in which not interested,* checked thirty-two times, and *an antagonistic feeling toward the required physical activity program which is a carry-over from high school experience,* checked thirty times, appear often enough to be of significance and may possibly have a relationship to each other.

TABLE IV

COMPOSITE RANK ORDER OF FACTORS

	Number	Per Cent
Inconvenience of dressing and undressing	181	12
Not time enough for dressing, with resultant feeling of untidiness	155	10.6
Failure of secondary school to develop elementary physical skills beyond the novice stage	134	9
Time allotment for each activity too short to develop skill in any one activity	132	9
Required to participate in activities in which not interested	131	9
Different degrees of skill in one class	120	8
Antagonistic feeling toward the required physical education program	96	6
Lack of time due to outside employment	67	4
Class too large	67	4
Required physical education without academic credit	60	4
Lack of student knowledge regarding content of the physical education program	55	
Time of day at which physical education program is scheduled	44	
Locker rooms not conveniently arranged	30	
Dislike of physical education activity in any form	25	
Hair arrangement disturbed, especially in regard to swimming	22	
Trend of academic thinking disturbed by physical activity during school hours	21	
Little opportunity in the activity program for student leadership experience	21	
Personality of teacher not appealing	21	
Uncongenial atmosphere in class	16	
Cosmetics not available for make-up after showers	14	
Gymnasium or pool not conveniently located in regard to other classes	13	
Dislike of the required costume	11	
Cold shower rooms	10	
Inability of teacher to get material over to students	9	
Written tests in physical education with grade	5	
Lack of swimming pool	5	
Showers with central control	2	
Total	1467	

It is evident from the composite ranking, that the tendency is for the first six factors to bear the greatest influence on the development of unfavorable attitudes toward physical education activity.

TABLE V

RANKING FACTORS IN THE PRELIMINARY STUDY AT BARNARD COLLEGE

	Number	Per Cent
Time allotment for each activity too short to develop skill in any one activity	22	11
Antagonistic feeling toward the required physical education program—a carry-over from high school	20	10
Time of day at which physical education is scheduled	20	10
Inconvenience of dressing and undressing	20	10
Failure of secondary schools to develop elementary physical skills beyond the novice stage	19	9.5
Required to participate in activities in which not interested	19	9.5
Hair arrangement disturbed, especially in regard to swimming	13	6.5
Not time enough for dressing, with resultant feeling of untidiness	12	6
Different degrees of skill in one class	11	5.5
Class too large	8	4
Trend of academic thinking disturbed by physical activity during school hours	8	
Dislike of physical education activity in any form	7	
Gymnasium or pool not conveniently located in regard to other classes	7	
Cold shower rooms	3	
Lack of student knowledge regarding content of physical education program	3	
Locker rooms not conveniently arranged	2	
Little opportunity in the activity program for student leadership experience	2	
Inability of teacher to get material over to class	1	
Required physical education without academic credit	1	
Lack of time due to outside employment	1	
Dislike of the required costume	1	
Total	200	

COMPARISON OF THE COMPOSITE RANKING WITH THAT OF THE BARNARD RANKING ON A PERCENTAGE BASIS

As the data from Barnard represents the checks of only forty-five people and the composite table is made on the basis of one hundred people from each school, the comparison is made on a percentage basis. *Inconvenience of dressing and undressing,* while accounting for 10 per cent of the votes in Table V, is out-ranked by *time allotment for each activity too short to develop skill in any one activity* which received 11 per cent of the votes.

In the composite table, these two factors represent 16 per cent and 9 per cent, respectively, of the total checks given to unfavorable influences. The high percentage of these two factors in Table IV and in Table V indicates a significant trend in attitudes, while the difference in the percentages of the same factors in Table IV and in Table V indicates that the range of importance is somewhat different in the state colleges than it is at Barnard College.

It is interesting to note that of the ten leading factors in Table IV, eight of them are also among the ten leading factors in Table V, with the percentages similar or identical in some cases. A comparison of these percentages may be seen in Table VI.

TABLE VI

COMPARISON OF THE PERCENTAGE RANKING OF EIGHT OF THE LEADING FACTORS IN TABLE IV AND TABLE V

	Per Cent	
Tables	*IV*	*V*
Inconvenience of dressing and undressing	12	10
Not time enough for dressing, with resultant feeling of untidiness	10	6
Failure of secondary schools to develop elementary physical skills beyond the novice stage	9	9
Time allotment for each activity too short to develop skill in any one activity	9	11
Required to participate in activities in which not interested	9	9
Different degrees of skill in one class	8	5
Antagonistic feeling toward the required physical education program—a carry-over from high school	6	10
Class too large	7	4

If any indications may be drawn from so limited a comparison, it would seem that the trend in unfavorable influences may be somewhat similar, regardless of whether the institution is a liberal arts college or a teacher-training institution.

Lack of time due to outside employment, which received 4 per cent of the checks in Table IV, is of very little significance in Table V where it received only .05 per cent of the total checks.

Required physical education without academic credit, representing 4 per cent of the checks in Table IV, is also of little significance in Table V as shown by its small percentage ranking.

Time of day at which physical education is scheduled, which in Table IV is rated 3 per cent of the total, accounts for 10 per cent of the total checks in Table V. This seems also to be largely an individual problem at Barnard as students are given a wide range of choice in hours and activities, and unless the schools make their schedules too heavy, it should be possible to find a convenient time for physical education activities.

The fact that *hair arrangement is disturbed, especially in regard to swimming* accounts for only 1 per cent of the total checks in Table IV while representing practically 7 per cent of Table V, is probably because the girls at Barnard swim during the winter, and at other schools represented in this study, swimming is either a summer activity or is not included in the activity program at all.

SUMMARY OF RESULTS

A checking sheet was devised to secure the reactions of college girls in regard to the influences that help to establish unfavorable attitudes toward the required physical education programs in colleges. From the

checking sheet, the factors were arranged in rank order for each school and a composite table made. The ten factors that have the tendency to be of the greatest influence in helping to establish unfavorable attitudes toward physical activity are:

(a) Inconvenience of dressing and undressing.

(b) Not time enough for dressing, with resultant feeling of untidiness.

(c) Failure of secondary schools to develop elementary physical skills beyond the novice stage.

(d) Time allotment for each activity too short to develop skill in any one activity.

(e) Required to participate in activities in which not interested.

(f) Different degrees of skill in one class.

(g) Antagonistic feeling toward the required program of physical education.

(h) Lack of time due to outside employment.

(i) Class too large.

(j) Required physical education without academic credit.

Comparing the composite ranking of the three schools with the ranking of preliminary study at Barnard, on a percentage basis, it is interesting to note that the first factor in each table in the same, and that the next seven factors in each table are the same, although ranked differently in the two tables.

CHAPTER III

GENERAL SUMMARY

Because this study covers so few schools, it seems advisable to state results in terms of questions raised, rather than in conclusions reached.

Analysis of the data received, indicates that *inconvenience of dressing and undressing* and *not time enough for dressing, with resultant feeling of untidiness* are the most frequent influences that help to establish unfavorable attitudes toward physical activity, and the high ranking given to them points to further study in a larger sampling of representative institutions in order that the reliability of these findings may be determined.

That *failure of secondary schools to develop elementary physical skills beyond the novice stage* is keenly felt is indicated by the rank of third place given to this factor. This expression of a trend in student opinion on a much-debated question may be of interest to educators. Does this factor have a casual relationship to that of *time allotment for each activity too short to develop skill in any one activity,* in that time which should be spent on perfecting skills is necessarily spent learning elementary skills?

The tendency for students to give high ranking to *required to participate in activities in which not interested* raises the question of whether

student needs and interests are being adequately met in our physical education programs?

How much of the trend in attitudes toward *different degrees of skill in one class* and toward *class too large* is due to inadequate instruction in the elementary school and how much is due to administrative difficulties?

Will the *antagonistic feeling toward the required physical education program—a carry-over from high school experience* gradually eliminate itself as secondary school programs of physical education continue to be broadened and more wisely administered?

These, and other questions, raised by this study are stated here in full realization of the limitations of this study which has been based on three schools only. As stated here, they offer suggestions for further objective research.

From the standpoint of administration, the results of this study are interesting and may be considered as an indication of the trend in unfavorable attitudes of college girls throughout the country toward the required physical education programs, due to the fact that the data were checked in representative parts of the country. Directors of physical education may find this study not only of reference value for administrative purposes, but also as an expression of the trend in student interests, needs, and desires in physical education.

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The Effect of External Temperature Changes on Heart Rate, Blood Pressure, Physical Efficiency, Respiration, and Body Temperature[1]

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PART I. HEART RATE

IN THE normal individual little attention is given to the effect of external temperature changes since the only thing to be considered is environmental comfort. The temperature changes which the individual normally encounters are not extreme, and in order to meet these changes provisions are made which are conducive to comfort.

The main factors which are manipulated in order to regulate the effects of external temperature changes are food, clothing, and exercise. Those who live in climates which change from hot to cold during the course of a year alter clothing accordingly. Years ago it was customary in many localities to seek comfort by adjusting the clothing to meet the extreme needs. However, due to information gained through modern research, it has become customary to adjust only the outer clothing so that one can meet the changes as they occur. Those who live in climates which are consistently hot or cold adjust their diets to fats, oils, and proteins, since these are known to be heat producing foods. Those who live in a consistently warm climate omit fats and oils and substitute vegetables. In the changeable climates the food adjustments are less adequately met, since diet becomes a matter of habit, and radical changes are difficult to make.

The question of exercise in relation to external temperature is one of utmost importance. It is generally accepted that exercise produces heat. It follows, then, that in consistently hot environments severe muscular exercise is usually avoided, while in consistently cold climates muscular exercise is conducive to comfort.

Under ordinary conditions, the temperature regulatory mechanism of the human body is adequate to meet the needs brought about by external temperature changes. This adjustment is brought about by the balance maintained between heat production and heat loss. In the normal

[1]From the Physiological Laboratories, Department of Physiology, College of Medicine, State University of Iowa.

resting individual this balance is so maintained that there is uniformity in blood pressure, pulse rate, frequency, depth of respiration, and body temperature.

The heat elimination in the human body is accomplished through the excretion of feces, urine, and saliva, through expired air, the evaporation of sweat, and by conduction, convection, and radiation from the skin. When food and water are taken into the body, their temperatures are materially lower than body temperature; but when they are excreted, as feces and urine, heat has been added to them in an amount equal to the difference between their temperatures when ingested and the temperature of the body. When air is inspired, its temperature is the same as that of the environmental air but when it is expired, its temperature is the same as body temperature. It is well known that when a liquid is evaporated from the surface, the temperature of that surface is materially lowered. Thus, the evaporation of sweat from the body surface is important in heat loss. However, it is recognized that the most important factors in the heat loss mechanism are conduction, convection, and radiation from the skin.

Experiments have shown that on the basis of a heat loss of 2470 calories, 1.8 per cent of the body heat is lost through the excretion of feces and urine, 10.7 per cent through expired air, 14.5 per cent through the evaporation of sweat, and 73 per cent through conduction, convection, and radiation from the skin.

It is evident that the body is equipped with a heat regulatory mechanism which is quite flexible. By drinking cooler water and eating cooler foods, the loss of heat through the excreta is facilitated. In a like manner the reverse is true. By increasing the force and depth of respiration, this mechanism is enhanced as a regulator of heat. By increasing the amount of evaporation of sweat, further heat loss is experienced, and by altering the conduction, convection, and radiation from the skin, heat loss is materially changed.

That the skin and the sweat glands which it contains are the most important factors in heat regulation has already been mentioned. It should be stated here, however, that their efficiency in this respect depends normally on reflex control through the sweat center in the medulla oblongata. When the heat loss and heat production become unbalanced, this nervous mechanism comes into play, causing either a peripheral constriction or dilation in accordance with the direction of the imbalance.

It is evident that with the mechanism for heat loss and heat production possessed by the body, there are ample provisions for regulation under ordinary conditions. The means with which the body is provided, together with adjustments which the individual has at his command, make possible the control of body temperature which is established as optimum for the physiological processes which go on in the body.

Although man's bodily equipment is adequate to meet his usual needs

regarding external temperature, artificial external temperature conditions are produced many times which are beyond the bodily equipment for regulation. Ordinarily, these artificial variations in the external temperature are set up with some definite purpose in mind. It is contended by some that by subjecting the body to heat or cold, physiological responses are improved; then again, certain activities necessitate the submission to external temperatures which are maintained by abnormal media which interfere with the temperature regulatory mechanism of the body. Swimming furnishes an example of this type of environment.

It is common practice for those who are about to engage in contests of strength and endurance to submit themselves to hot or warm steam, believing that it enhances their performance. It is the custom of practically all those who engage in strenuous exercise to submit themselves to some type of water bath either before or after the exercise. Those who indulge in the sport of swimming encounter man's most unnatural environment in which to do strenuous exercise. Even though in this sport the water temperature is comparable to the atmospheric temperature, the heat regulatory mechanism of the body is seriously interfered with, resulting in modified physiological response.

Although this experiment deals exclusively with normal individuals, it should be mentioned that in certain types of nervous diseases, patients are frequently subjected to submersion in water which is considered "neutral" because its temperature is 98° F. These baths tend to quiet the maniac type, and therefore it is evident that some physiological changes have been brought about.

The important place which hydrotherapy holds in the treatment of disease must not be overlooked. Ablution is a common practice in mild, infectious fevers; the half bath is practiced in the treatment of acute fevers without organic lesions; affusion, which is comparable to the common shower, is frequently used in cases of unconsciousness, delirium, meningitis, and cerebral disturbances; the sheet bath is common in chlerosis, melancholia, neuralgia, pulmonary and bronchial diseases; the cold rub is practiced in defective haemotosis, rest cures, and sleeplessness; the wet pack is generally known for its calming effect and the wet compress is generally recognized as either stimulating or depressing, according to its temperature; the full cold bath is recognized as invigorating the vital organs and as useful in infections; the full warm bath is employed for reducing temperature, assuaging pain, and relieving nervous debility.

The universality of the use of water in altering the external temperature of the body artificially, together with the uncertainty of some of the claims made as to the efforts of such procedure, prompted this investigation. It is not the purpose to discredit or substantiate any of the claims made concerning the effect of submersion in water on the behavior of man, but rather to demonstrate some of the physiological alternations which are caused by such a course. In the following discussion the procedures used and the results obtained are presented.

STATEMENT OF THE PROBLEM

The problems investigated and herein reported are the effects of external temperature changes as brought about by subjecting individuals to water of varying temperatures on the following physiological functions:

1. Circulation
   a. Heart rate
   b. Blood pressure
   c. Physical efficiency as based on the pulse-ratio test
2. Respiration
3. Body temperature

There have been a number of investigations carried out which involve the problems mentioned here. The results of the investigation of others are now considered.

REVIEW OF LITERATURE

The volume of literature having a bearing on this problem is so great that space permits of only a succinct statement of the results of researches which have a direct relation to this investigation.

Heart Rate.—Martin[1]* reported an experiment concerning the effect of external temperature changes on the isolated dog's heart. It was found that any change in temperature affected the heart rate in such a way that the rate change was substantially parallel to the change in temperature. It was suggested that the heart rate change of the isolated organ is much less complicated than when the heart is intact. It was also observed that there was always a tendency for the heart rate to change more rapidly when the temperature was rising than when it was falling.

Hill and Flack[2] investigated the relationship between rectal temperature and heart rate while subjects were submerged in water. They found a mean increase in heart rate of forty-four beats per minute with a rise in rectal temperature of two and four-tenths degrees.

Bazett[3] observed an increase of thirty-seven beats per minute for a rise in body temperature of two degrees centigrade, when the change in body temperature was caused by submersion in hot water. In general, the results showed that submersion in hot water caused an increase in heart rate, while submersion in cold caused a decrease.

Strasburger,[4] Hill,[5] Hill and Flack,[2] Mueller,[6] Walti-Kettiger,[7] and Palmer[8] found that submersion in cold water caused the heart rate to decrease. For water, the neutral point is between thirty and thirty-seven degrees centigrade with slight variations. Strasburger, in his investigation, attempted to show that thirty-four to thirty-five degrees centigrade is to be regarded as indifferent for heart rate.

Kellog[9] reports that submersion in cold water causes an initial increase in heart rate followed by a decrease, while for hot water, there is a decrease followed by an increase.

*Figures refer to bibliography at end of Part II which will appear in a later issue.

Ambland[10] found that when subjects were immersed in water at 96.8 degrees Fahrenheit for one-half hour, no change in heart rate occurred. However, when the water temperature was 104 to 111 degrees Fahrenheit there was an increase of from 70 to 90 beats per minute. Ambland concludes that the heart rate during submersion in warm water can be divided into two parts, i.e., the first change appearing in the form of a sharp peak which takes place during the first 5 to 10 minutes, after which the heart rate is directed upward after the temperature reaches 36 degrees or 37 degrees centigrade. The second part of the curve is very variable, sometimes, but not often, appearing as a horizontal line.

A summary of the literature dealing with the effect of external temperature changes as brought about by submersion in water of varying temperatures on the heart rate shows that, in general, a lowering of the temperature decreases, and a raising of it increases the heart rate, the neutral point being about body temperature.

Blood Pressure.—Edgecomb and Bain[11] investigated the effect of submersion in cold water on blood pressure. It was found that submersion in cold water caused a rise in arterial blood pressure and also a fall in venous pressure at the same time.

Strasburger[4] observed that the systolic pressure rose initially in cold water submersion, fell again a little later, and then rose a second time. He points out that the results are complicated; that when the water temperature is above forty degrees centigrade, the blood pressure is often above normal, while warm water submersion usually causes a fall in pressure.

Bazett,[3] in his review of literature dealing with the effect of submersion in water on circulation, concludes that the evidence points to the fact that submersion in cold water causes a rise in blood pressure while hot water lowers it. Our review of the literature substantiates the conclusions of Bazett.

Palmer[8] noted that exposure to warm water caused arterial pressure changes which are less constant since an increased heart output is accompanied by a lack of high resistance in the peripheral blood vessels which prevents the blood from returning to the heart.

Edgecomb and Bain[11] found that submersion in warm water caused a considerable fall in systolic pressure, while the diastolic pressure showed a similar but less noticeable fall. They noted further that venous pressure was reduced by submersion in either hot or cold water.

Walti-Kettiger[7] found that the curve of systolic pressure during submersion had three characteristics, i.e., an increase, a decrease, and then an increase. However, in some cases, all the phases were not present. It was also pointed out that the colder the water in which a subject was submerged, the more marked the initial rise. Furthermore, the hotter the water, the more marked was the fall. During submersion in warm water, the blood pressure, notwithstanding its initial rise, showed the same ten-

dency to drop as during submersion in cold water; the systolic blood pressure above the indifferent point shows similar changes to those slightly below the indifferent point.

Physical Efficiency.—A survey of the literature yields very little information concerning the effects of external temperature changes on physical efficiency as rated by the pulse-ratio test. The only work having any bearing on the subject is that of Dill, Bauer, and Levenson,[12] who demonstrated that the increase in heart rate due to light exercise is practically independent of the external temperature changes. This is included because the increase in heart rate and the return to normal is the basic principle involved in the pulse-ratio test for physical efficiency.

Respiration.—Landis and co-workers[13] reported that in man the respiratory rate may be increased by submersion in hot water and decreased by cold water. When the rise in temperature is rapid, a very definite hyperpnea develops. The rate may at first be slightly less than normal, the respiration being very deep. It was also found that whenever submersion in water caused the body temperature to rise, total ventilation steadily increased. The primary effect is evidently due to changes in body temperature. The increase in minute volume is relatively slow at first, but as body temperature reaches higher levels, even though the rate of the increase becomes slower, the gradient of increase in ventilation is often steeper. As body temperature rises, due to submersion in hot water, total ventilation becomes greater to an increasing degree, although the rate of rise of body temperature remains constant throughout. Landis concludes that the increase in ventilation during an increase in body temperature is due partly to the rate of rise of body temperature and partly to the absolute level of body temperature. The first effect which appears in the majority of cases is an increase in tidal air accompanied by an increase in total ventilation, while the respiratory rate remains constant or may even fall. The increased ventilation at first usually results from increased amplitude, and later by an increase in respiratory rate. During the latter part of the experimental period, both rate and depth increase together.

Hill and Flack[2] observed an increase in respiratory rate of four out of five subjects when the temperature rose above 102 degrees Fahrenheit.

Palmer[8] found that when the body is submerged in hot water (98 degrees to 108 degrees Fahrenheit) there is no uniform change in the rate and amplitude of respiration, while in cold water (88 degrees to 98 degrees Fahrenheit) the respiratory rate is slightly decreased but the effect is not constant.

Wasserman[14] observed in his experiments that when submersion occurred in cold water, respiration became deeper.

A summary of the review of literature relative to the effect of external temperature change brought about by submersion in water indicates that an increase in external temperature causes an increase in the force and rate of respiration.

Body Temperature.—Changes in external temperature produce their effect by causing variations in body temperature. Claude Bernard[15] recognized the fact that submersion in water above body temperature caused a rise in body temperature which is much more rapid than that produced by moist air at a much higher temperature. This is particularly true with a water shower where the results are similar to those produced by complete submersion. This fact is evident because the direct transference of heat from the water to the body is possible, due to its high heat capacity and relatively high conductivity.

Bazett[3] demonstrated that if the water in which a subject is submerged be kept stirred and the subject's skin be flushed with blood, the temperature of the subject is prevented from rising more than a degree above that of the bath. Furthermore, sweating may be profuse when the body is submerged in hot water, but since evaporation is prevented the subject becomes dessicated without a decrease in body temperature.

Kellog[9] found that the effect of cold water upon the organism over a short period of time increases heat production, but when prolonged, decreases it. Hot water over a short period of time decreases heat production, but when the period is increased, heat production is increased.

Hill and his co-workers[2] found that when subjects were submerged in water of 105 degrees Fahrenheit, the body temperatures reached a height of 103.8 degrees Fahrenheit.

The literature indicates that an increase in external temperature by submersion in water of varying temperatures causes an increase in body temperature.

In all the experiments carried out by the writer, external temperature changes were brought about by submersion in water of varying temperature. The technique by which the work was done is next described.

GENERAL TECHNIQUE

A consideration of the problem of how to change the external temperature of the body most conveniently led to the adoption of the application of water. This method proved to be very efficient, since the Psychopathic Hospital is equipped with submersion bath tanks which are provided with automatic temperature controls. The lower limitation of the water bath depends entirely on the temperature of the tap water. Of course, the upper limit is far above the endurance of the subject.

The general method of procedure in using water of varying temperatures was to lay the subject in the empty tank. From this position, any of the desired normal readings were taken. After normal data were obtained, water from the tap was gradually let in. In some experiments, records were made while the tank was filling. It should be stated here that temperature changes were always from cold to hot. After the response under investigation became established, hot water was let into the tank, during which time the water was continually stirred, until the desired

temperature was reached. In each case the water temperature was kept constant long enough for the responses of the subject to become adapted. The temperature was recorded by a standard Fahrenheit thermometer. Uniformity of temperature throughout the water was always maintained by stirring and then recording the temperature in various parts. Uniformity was enhanced by the fact that the tanks were provided with inlets all the way around the sides.

In some parts of the experiment the water of varying temperature was sprayed over the subjects. This was done by means of the standard shower. A Fahrenheit thermometer was placed in the shower stream for the purpose of recording the temperature of the water. The temperatures were maintained by automatic mixing devices placed in the union of the cold and hot water inlets. In general, the shower technique was the same as that for the tank. It should be noted here that records were made while the subjects were sitting under the shower.

In each part of the experiment the technique employed was adjusted to suit the experiment under consideration.

THE EFFECT OF EXTERNAL TEMPERATURE CHANGES BROUGHT ABOUT BY SUBMERSION IN WATER AND WATER SHOWERS OF VARYING TEMPERATURES ON THE CIRCULATORY SYSTEM

Previous investigations have shown that alterations in external temperature changes brought about by submersion in water alters the response of the circulatory system. However, those who have investigated this question have submerged subjects in water of varying degrees, but as far as we are able to find, no one has carried out a continuous experiment, beginning with a low temperature and gradually increasing it to a high one, making complete observations throughout the change. In the investigation herein reported, such a procedure was followed so that a complete picture of circulatory changes was recorded.

Two aspects of the circulatory system were considered, viz., heart rate and blood pressure.

THE EFFECT OF EXTERNAL TEMPERATURE CHANGES AS BROUGHT ABOUT BY WATER OF VARYING TEMPERATURES ON HEART RATE

The effect of external temperature changes on the heart rate brought about by water of varying temperatures is considered first.

Procedure.—The external temperature changes were brought about by both submersion and spraying water over the subjects as previously described. During the submersion experiment, the subject was in a supine position, except, of course, that the head was out of the water. When the spray was used, the subject was seated under the shower so that the entire body was in the spray.

The heart rate was counted by means of a stethoscope and the time intervals were measured by a stop watch.

The heart rate was determined for every five degrees of temperature change, beginning at the temperature of the tap water and ending at the point where the subject appeared extremely uncomfortable and rather faint. In each instance a given temperature was maintained until the pulse rate for the temperature in question became steady and uniform. It was considered as such when three consecutive counts for one minute each with a minute or more elapsing between each count gave results which were the same within the limits of error in counting.

When all was in readiness, the subject was placed in the tank or under the shower, depending on the experiment. As soon as the pulse rate became steady, the water was let in and the readings were taken as described above.

The Data.—In the submersion experiments, 46 normal male subjects ranging in ages from 24 to 46 years were used. For the experiment where the water was sprayed on the subject, two groups, A and B, were included. The age range of the subjects in groups A and B was 14 to 18 years. Group A consisted of 84 non-athletes, and group B of 50 athletes in training. In this experiment, the temperature of the water was varied from 65 degrees to 110 degrees Fahrenheit, with step intervals of 5 degrees, except in case of the athletes where the experiment was terminated at 105 degrees Fahrenheit. The effect of various temperature changes on the heart rate is shown for the submersion experiment in Table I and for the shower experiment in Table II.†

These data are shown graphically in Fig. 1.

In the submersion experiment, one subject became dizzy, nauseated, and generally uncomfortable, so that the experiment in his case was terminated at 105 degrees Fahrenheit. In case of group A, where the water was sprayed on the subject, all but 12 of them objected to temperature greater than 105 degrees Fahrenheit, so that in 72 cases the experiment was terminated at this point. For group B, all the subjects objected to temperature greater than 105 degrees Fahrenheit and the experiment was discontinued.

TABLE I

THE EFFECT OF SUBMERSION IN WATER OF VARYING TEMPERATURE ON THE HEART RATE

Temperature Degree F.	Heart Rate per min.	Temperature Degree F.	Heart Rate per min.
Normal	75 ± 1.41	90	64 ± 1.14
65	72 ± 1.53	95	64 ± 1.14
70	71 ± 1.44	100	70 ± 1.27
75	68 ± 1.33	105	87 ± 1.65
80	66 ± 1.42	110	120 ± 1.82
85	65 ± 1.23		

†These are summary tables. The raw data tables are excluded from the main body of this study, but are on file in the library of the State University of Iowa.

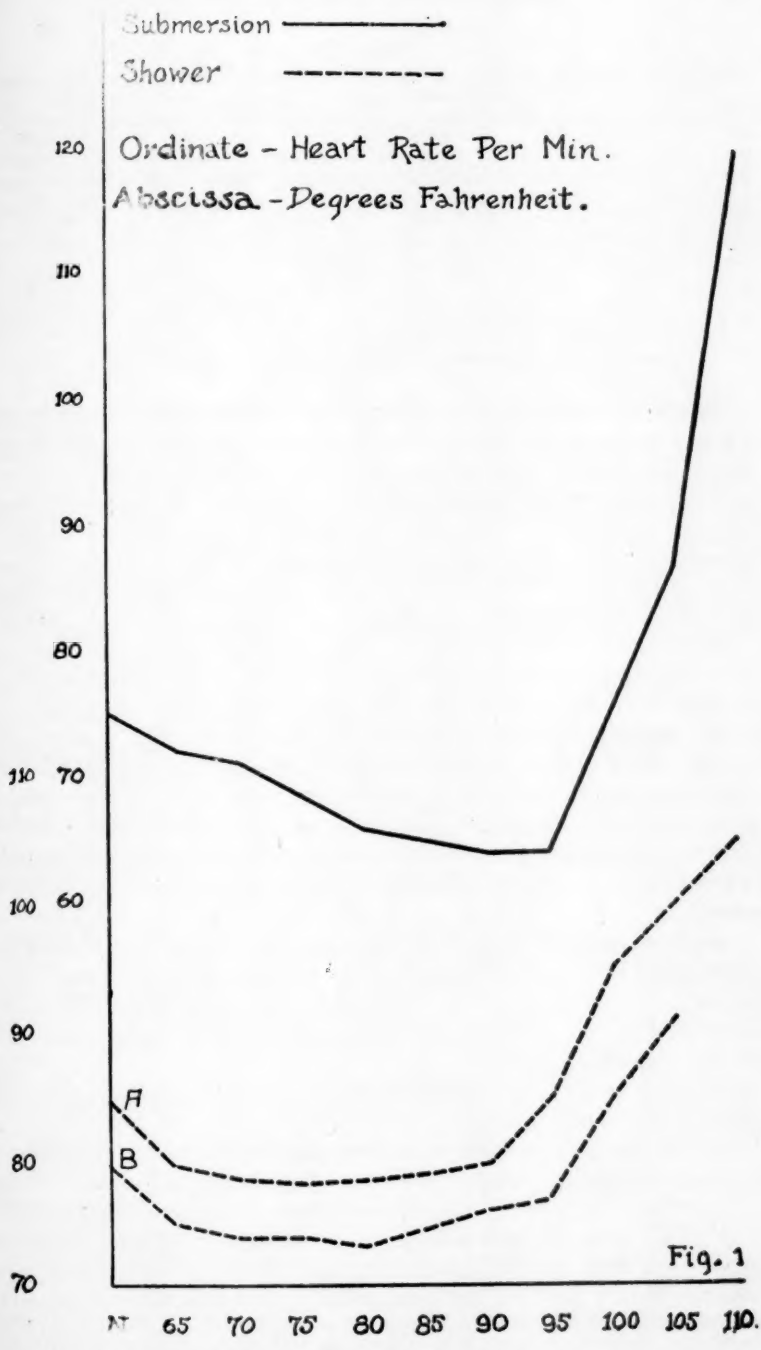

FIG. 1. The effect of external temperature changes as brought about by water of varying degrees on heart rate. A, non-athletes; B, athletes.

TABLE II

THE EFFECT OF EXTERNAL TEMPERATURE CHANGES ON HEART RATE BROUGHT ABOUT BY SPRAYING WATER ON SUBJECTS

Temperature Degree F.	Group A Non-Athlete Rate per minute	Group B Athlete Rate per minute	Temperature Degree F.	Group A Non-Athlete Rate per minute	Group B Athlete Rate per minute
Normal	86 ± .84	80 ± 1.03	90	80 ± .69	76 ± .72
65	80 ± .75	75 ± .90	95	85 ± .78	77 ± .97
70	79 ± .80	74 ± .90	100	94 ± .88	84 ± 1.08
75	79 ± .70	74 ± .81	105	102 ± .91	91 ± 1.13
80	78 ± .65	74 ± .83	110	105 ± 3.63	
85	79 ± .66	74 ± .84			

The data presented in Table I show that when a subject is submerged in water the heart rate decreases until the water temperature reaches 95 degrees Fahrenheit, after which there is an increase in rate as long as the water temperature is raised. Somewhere between 100 degrees Fahrenheit and 105 degrees Fahrenheit, the heart rate becomes normal. The data show also that the decrease in heart rate is gradual as is the rise up to 105 degrees Fahrenheit. From here on, as the temperature of the water is increased, the heart rate undergoes an erratic rise.

The data in Table II show that spraying water of varying degrees on a subject causes changes in heart rate similar to those brought about by submersion. In group A, there is a gradual decrease in heart rate until eighty degrees Fahrenheit is reached. From here on, there is a gradual increase. For Group B, there is a decrease until seventy degrees Fahrenheit is reached. The heart rate remained the same until the temperature of the water was raised to eighty-five degrees Fahrenheit. From here on, there was a gradual increase. Somewhere between ninety-five degrees Fahrenheit and one hundred degrees Fahrenheit, the heart rate became normal.

Another point of interest brought out by the experiment on non-athletes and athletes is that the changes brought about by the external temperature variations are less pronounced in the athletic than in the non-athletic group. It is evident that athletic training tends to stabilize the response of the heart.

In order to show the individual tendencies of the group in the submersion experiment, Table III is presented.[1]

This is further evidence that submersion in water of varying degrees caused a decrease in heart rate from sixty-five degrees Fahrenheit to one

[1]The P.E. of the per cent is found by the formula $P.E. = .6745\sqrt{\frac{PQ}{N}}$ (See G.U. Yule, *Introduction to the Theory of Statistics*. London: C. Griffin and Co., 1924, 7th edition, P. 257). The data are interpreted in the light of the per cent of those conforming to the general tendencies indicated by the group mean. The difference between the per cent conforming and one hundred represents the per cent of the group which did not conform. The P.E. is the same for both the conformed and unconformed group.

TABLE III

THIS TABLE SHOWS THE PER CENT OF SUBJECTS IN THE SUBMERSION EXPERIMENT CONFORMING TO THE GENERAL TENDENCIES FOUND ON THE BASIS OF MEANS

Temperature Degree F.	Per Cent Showing Pulse Rate Change	Per Cent from 50–50 Chance
65	-70 ± 4.56	20
70	-65 ± 4.74	15
75	-74 ± 4.36	24
80	-78 ± 3.99	28
85	-80 ± 3.98	30
90	-88 ± 2.69	38
95	-90 ± 2.98	40
100	-72 ± 4.25	22
105	$+83 \pm 4.28$	32

hundred degrees Fahrenheit. The neutral point is evidently in the immediate neighborhood of one hundred degrees Fahrenheit. Somewhere around one hundred degrees Fahrenheit the submersion causes an increase in heart rate. The most effective temperature for producing a decrease in heart rate is ninety-five degrees Fahrenheit where 90 per cent of the cases gave this reaction.

The individual tendencies of the response of the hearts of the subjects in group A are shown in Table IV.

TABLE IV

THIS TABLE SHOWS THE PER CENT OF THE NON-ATHLETES IN THE SHOWER EXPERIMENT CONFORMING TO THE TENDENCIES AS INDICATED BY THE MEANS FOR THE GROUP

Temperature Degree F.	Per Cent Showing Pulse Rate Change	Per Cent from 50–50 Chance
65	-75 ± 3.12	25
70	-75 ± 3.12	25
75	-82 ± 2.83	32
80	-82 ± 2.83	32
85	-86 ± 2.83	36
90	-75 ± 3.12	25
95	$+51 \pm 3.68$	1
100	$+77 \pm 3.10$	27
105	$+85 \pm 2.43$	35

The data presented in Table IV show, in general, the same tendencies as those in Table III. Spraying water on the subjects caused a decrease in heart rate of the great majority of the group when the temperatures varied from sixty-five degrees Fahrenheit to ninety-five degrees Fahrenheit. The most effective temperature was eighty-five degrees Fahrenheit. The neutral temperature is evidently ninety-five degrees Fahrenheit. Above ninety-five degrees Fahrenheit, the number of subjects experiencing an increase in heart rate gradually becomes greater.

Table V is presented in order to show the number of subjects in group B, athletes, who conform to the tendencies indicated by the means for the group.

TABLE V

THIS TABLE SHOWS THE PER CENT OF SUBJECTS IN GROUP B, ATHLETES, CONFORMING TO THE GENERAL TENDENCIES FOUND ON THE BASIS OF MEANS FOR THE WHOLE GROUP

Temperature Degree F.	Per Cent Showing Pulse Rate Change	Per Cent from 50–50 Chance
65	-80 ± 3.80	30
70	-82 ± 3.62	32
75	-82 ± 3.62	32
80	-88 ± 3.14	38
85	-80 ± 3.86	30
90	-74 ± 4.15	26
95	-58 ± 3.24	8
100	$+70 \pm 4.41$	30
105	$+88 \pm 3.10$	38

Here again we find the heart rate of the great majority of the cases decreasing when the spray temperature is between 65 degrees Fahrenheit and 95 degrees Fahrenheit. The neutral point lies between 95 degrees Fahrenheit and 100 degrees Fahrenheit. Somewhere between 95 degrees Fahrenheit and 100 degrees Fahrenheit, the tendency is toward an increase in heart rate which continues to the termination of the experiment at 105 degrees Fahrenheit.

In order to show the variation from step to step, using five degrees Fahrenheit, in the submersion experiment, Table 6 is presented. Since these data are similar to the rest, this procedure is not carried out for the other experiments.

TABLE VI

THIS TABLE SHOWS THE VARIATION IN PULSE RATE FROM STEP TO STEP, FIVE DEGREES FAHRENHEIT, FOR THE SUBMERSION EXPERIMENT

Temperature Degree F.	Per Cent Showing Pulse Rate Change	Per Cent from 50–50 Chance
65	-65 ± 4.74	15
70	-49 ± 4.97	1
75	-62 ± 4.82	12
80	-69 ± 4.56	19
85	-58 ± 5.11	8
90	-51 ± 4.97	1
95	-34 ± 4.70	16
100	-20 ± 3.99	30
105	+100	
110	+100	

For example, the data indicate that 65 per cent have a lower pulse at 65 degrees Fahrenheit than normal and 100 per cent have a higher pulse at 110 degrees Fahrenheit than at 105 degrees Fahrenheit.

Conclusion.—On the basis of the data just presented, changes in external temperature of the body brought about by water of varying temperatures produce the following changes in heart rate:

1. When the body is submerged in water varying in temperature from 65 degrees Fahrenheit to 110 degrees Fahrenheit, there is at first a decrease in heart rate, the lowest point, being reached at 90 degrees Fahrenheit and 95 degrees Fahrenheit. From this point on, the heart rate increases gradually up to 105 degrees Fahrenheit. A further increase in the water temperature causes an erratic increase in heart rate.

2. When water of varying temperatures is sprayed on the bodies of non-athletes, there is, at first, a decrease in heart rate, the lowest point being reached at eighty degrees Fahrenheit. From this point on, there is a gradual increase in heart rate up to one hundred degrees Fahrenheit. As the water temperature increases, the change becomes more pronounced.

3. When water of varying degrees is sprayed on the bodies of athletes, there is, at first, a decrease in heart rate, the lowest point being reached at seventy degrees Fahrenheit. A further increase in temperature up to eighty-five degrees Fahrenheit causes no change. From eighty-five degrees Fahrenheit on, there is a gradual increase in heart rate.

4. The neutral point for water in which subjects are submerged lies between 100 degrees Fahrenheit and 105 degrees Fahrenheit. For the spray, the neutral point was found to be between 95 degrees Fahrenheit and 100 degrees Fahrenheit.

5. The effects of water of varying temperatures on the heart rate are much more pronounced where the subjects are submerged than when the water is sprayed on them.

6. The response of the hearts of athletes to the water of varying temperature is less pronounced than in case of non-athletes.

The effect of external temperature changes on blood pressure, physical efficiency, respiration, and body temperature, together with the bibliography, will appear as Part 2 in a later issue of this journal.

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BOOK REVIEWS

HABITS FOR SAFETY. Harry W. Gentles and George H. Betts. (Bobbs-Merrill Company, 1932), 228 pages. Illus. 67c.

As stated by the authors, this book is flexible enough in its content to be adaptable to a course of study in safety, to the instructional part of health education, or as a correlative aid in integrating safety throughout the school curriculum. It is primarily adapted to the fifth and sixth grade levels.

Seventy pages are devoted to first aid and the remainder of the book to general safety procedure. These chapters on first aid are well done and doubtless have a definite place in a book of this sort, but there is nothing particularly new either in the subject matter or in the approach. They deal with bandaging, resuscitation methods, "carries," etc.

The best contribution is found in the chapters on general safety. These contain really worthwhile material, for the most part, simply written and amply illustrated with tables, drawings, and photographs, which, if the book be used as a text, should interest the child in his own safety and in that of his comrades.

Home, school, and community (whether it be urban or rural) are considered. Whereas the dangers of the automobile traffic in congested areas are stressed the authors have not omitted citing the dangers involved in caring for farm animals and in the use of farm implements. Prevention of accidents in the home is well handled but the chapter on school safety is inadequate and doubtless could have been much improved upon.

The chapters on "Workers and Their Safety" is of doubtful value since children in the fifth and sixth grades can hardly grasp the significance of such data as 2,584 accidents in mines and quarries during a recent year and 313 accidents among seamen and stevedores.

V. S. BLANCHARD,
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Detroit, Mich. Public Schools.

THE ATHLETE IN THE MAKING. Jesse Feiring Williams, M.D., and Eugene White Nixon, M.A. (W. B. Saunders Company, 1932), 258 pages. $2.50.

This is without question one of the most deserving texts ever presented in the field of physical education and sport. Among its chief merits may be mentioned the thorough covering of the subject, the sanity of treatment, and the simplicity of statement. The authors have ranged widely, particularly in the fields of physiology of exercise and physiological psychology. They have brought together in condensed form an exceptionally well selected group of scientific facts and have continuously made practical application of these to specific situations in physical activity.

In several places the authors have exercised restraint to avoid entering into explanations which might have been too technical. In some respects this is regrettable, because where they have undertaken to discuss problems of physiological chemistry, they have succeeded so admirably that a treatment of some additional subjects would have been welcome. For example, in the treatment of fatigue, there is no consideration of the re-synthesis of lactic acid. In general, fatigue is admirably treated, the distinction between fatigue and exhaustion clearly drawn,

but more care in the use of these terms (page 47) would have helped. The question might be raised as to the location of fatigue. The inference (page 125) seems to be that the chemical condition of the muscles themselves as to waste accumulation is the cause, whereas there appears to be evidence that in the motor nerves (synapses) the real problem arises.

For the athlete, teacher, or coach, there is no single source of information available which approaches in value this compilation. Not only in matters of technical training is the text superior, but it cannot be too highly commended in its emphasis on spirit and sportsmanship. The details as to how to promote these are splendid. Whether the student wishes to study the elements of athletic success, training and conditioning, or the application of the principles established to football, golf, baseball, tennis, swimming, track and field, he will find in this handbook, a veritable *vade mecum*.

A complete topical index renders the material readily available, and action pictures of men and women prominent in sport add to the attractiveness and interest of the publication.

G. B. Affleck
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Greek Games. Compiled by Mary Patricia O'Donnell and Lelia M. Finan. (A. S. Barnes & Co., 1932), 170 pages, 50 illus. $4.00.

Today physical education activities are being challenged as to their place in the school and college curricula. Physical educators are being asked to justify practical classes and their place in education. No finer answer or justification can be found, at least in the field of the dance, than in the book, *Greek Games*.

The book deals with the Greek Games, a Spring Festival established in 1903, at Barnard College, New York City. The structure of the games is a blend of poetry, music, dance, costumes, and athletics, originated by the students. The work is carried on by them in their regular physical education classes and as extra-curricular activities, with the help of faculty advisers in the departments of Physical Education, Music, English, Greek and Latin.

Miss Agnes R. Wayman in her "Appreciation of the Games" states: "Just as music and poetry and athletics played a prominent part in the education of the Greek youth to the end that there might be harmony of body and mind and soul, so the Games and all that they demand in the way of thought and preparation tend to emphasize in the lives of the students participating a striving for beauty and perfection for itself alone. Here is an ideal way of education! Results mean nothing in themselves. The real value lies in the effort put into and the experience gained from each attempt. In so many college and school productions, the participants are automatons, drilled in every movement with little or no opportunity to create; but one of the outstanding features of the Games is the opportunity they give students to create, to interpret, and to express. Probably nowhere in college life is there a better example of progressive education, a finer expression of the newer emphasis in physical education."

The authors have included in the book the complete organization of the Games with examples of the Entrance, Dance, Lyrics, Music, and Athletics. Diagrams and illustrations accompany the examples. The book, as they state, has been written with the hope that it may be of value to those who organize festivals, large or small, national, symbolical, or historical. To attempt a reproduction of the descriptive material in the book would mean the loss of those educational values inherent in the project, but any school, college, or camp may well use the foundation of the Greek Games for a beautiful, inspiring, and educational program.

Helen Norman Smith
University of Cincinnati.

CHARGES AND FEES. Report of a Study made by the National Recreation Association. 158 pages. $1.00 paper. $1.50 cloth.

The publication of this book is timely because of the large interest being given to the consideration of ways and means of making additional recreation facilities available to people out of work.

The reduced budgets of all municipal departments throughout the entire country makes the question of increased revenue a very important one.

This publication by the National Recreation Association gives information as to the present practices and principles guiding the levying of fees and charges for recreation activities and the present trend of such charges. The information contained is valuable to all public playground and recreation executives as well as park and school authorities.

The present practice of charging fees seems to be a matter of tradition rather than experience, although there are questions of discipline and additional facilities involved.

On the other hand, there are many doubts raised as to whether the practice of charging for recreation facilities is not a double taxation, as most public facilities are financed through appropriation by taxes by the appropriating bodies of various municipalities. There is also the question of whether it does not commercialize public recreation, and whether it will not in the long run result in lower appropriations by the appropriating body of the municipality.

The book, *Charges and Fees*, is a compilation of charges now being made by the various municipal bodies for forty-five different recreational activities and the legislation authorizing them, and if any recreation, school, or park executive is confronted with the problem of charging, he can easily secure information in this publication as to what are the practices in other cities.

C. E. BREWER
Commissioner of Recreation, Detroit, Mich.

PYRAMIDS ILLUSTRATED. Mathias Macherey and John Richards. (A. S. Barnes & Company, 1932), 190 pages. $3.00.

Pyramids Illustrated is an excellent and comprehensive collection of all types of pyramids together with teaching aids used in developing them. The authors describe the types of physiques and temperaments best suited for the people making up the various parts of a pyramid. They stress symmetry and grace and emphasize the fact that girls and women can build pyramids as well as boys and men. Much material is presented which is suitable for girls and women. The simplicity and ease with which pyramid building is learned is explained clearly, and stress is laid on the fact that suitable costumes are necessary to give the proper effect of a beautiful pyramid.

Explicit directions are given for simple beginning exercises for two people, and at the end of each series of such exercises the authors show how to combine them into simple pyramids. This same procedure is carried out for more advanced exercises. Pyramids are placed in four main classifications and complete descriptions are given for building each type together with instructions for building them when using various numbers of people. Two hundred twenty-one pyramids are drawn out and explained clearly. This is the most compact, all-inclusive book on pyramids I have had the privilege of reading.

STRONG HINMAN
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THE INFLUENCE OF SOCIAL AND ECONOMIC FACTORS ON THE HEALTH OF THE SCHOOL CHILD. Raymond Franzen. School Health Research Monograph No. IV. (American Child Health Association, 1932), 144 pages.

The volume is a research monograph consisting chiefly of correlations—raw, inter-, and multiple—between each phase and factor of the data on socio-

economic status gathered by the Child Health Survey in 1927-28 in 86 American cities. The measures discussed are: (1) the economic ratings made by the superintendents of schools, (2) a measure based on the relation of the rental value of children's homes to city tax levy on the same property, (3) the population of the city, (4) cultural status of nativity stocks, (5) cleanliness, (6) age, (7) grade, (8) intelligence.

Standard statistical procedures were used to do three things:

1. *To test* the measures of socio-economic status employed.
2. *To determine* the effect of each of the various factors, and of all of them together, upon measures of child health.
3. *To correct* the raw data on child health for observed differences in the socio-economic status.

That is, the main purpose of the volume is to arrive at measures of health when allowance has been made for differences due to socio-economic status. The corrected scores are called "residuals." The comparison of these residuals is expected to make evident any effects upon child health produced *solely* by differences in school health procedures. The study thus recognizes, as few other investigations have, the need for the reduction of raw data to "single variable" conditions before attempting comparisons and evaluations.

One finds many suggestive and important conclusions. For instance, socio-economic forces have a very marked influence upon nearly all of our measures of health (page 6).

When a group (of children in the fifth and sixth grades) is young for the grade, it is most likely to be bright, have a good economic status, and be clean. The converse is also true (page 20).

In general, it is among the better economic classes and the cleaner children that bitten nails are most often found (page 65).

The detection, segregation, and special treatment of defects in hearing have a definite relation to economic privilege. This contrasts with uncorrected vision defects which do not show any marked tendency to occur more frequently in the lower economic groups (page 68).

It is a type of home care and a kind of culture rather than the quality of economic background which controls the occurrence of pediculosis in the boys and girls of our American schools (page 73).

The most interesting conclusion of all, at least to one statistically inclined, is that in general the correlation between economic status and school health results should be reduced as school health practice advances (page 77). For this statement directs attention to a simple criterion for judging the effectiveness of any school health program.

As a whole the monograph will repay careful study. The average teacher will be confused by the statistical discussions but need read only the foreword, the summaries, and the final statement (page 85) to get the gist of the message. The monograph is based on sound scientific reasoning even though the validity of correlational technique is assumed with a naïveté in sharp contrast with the scientific care used in planning.

S. A. COURTIS
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SEXUAL SIDE OF MARRIAGE. M. J. Exner. (W. W. Norton & Company, Inc., 1932), 252 pages. $2.50.

This recent publication of Dr. Exner, the well-known social hygienist, is an authoritative book that meets most adequately and without affectation a real need. It has a decided advantage over most of the recent publications on this subject in that it is written with the interests of both young men and young women in mind. The majority of these books are prone to con-

sider only the woman's side of this problem.

The style on the whole is interesting and the material is well presented. The psychology of the author throughout is unusually sound. There seems to be no presentation to which one could take exception.

The high spots are the first chapter which describes so simply and ideally Dr. Exner's conception of "Sex in Life," and the chapter on "Sex Differences." The chapter on "Sex Factors in Ideal Marriage," though repetitious, is warranted.

The book is made up of seven chapters which include—(1) Sex in Life; (2) Sex Mechanism; (3) Sex Differences; (4) Sex Factors and Mal-Adjustment; (5) Other Factors and Mal-Adjustment; (6) Sex Factors in Ideal Marriage; (7) The Family.

As is the case in such a book, there is necessarily a good deal of repetition throughout, but this is rather an advantage than a draw-back because many of these facts are deserving of repetition until they are better understood.

MARGARET BELL, M.D.
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A CHILD'S BOOK OF THE TEETH. (Revised and Enlarged Edition). Harrison Wader Ferguson, D.D.S. (World Book Co., 1932), 106 pages. 68c.

Mouth hygiene is a very important part in the health education program. We realize more fully each year that desirable activity is the goal of health education. The formation of habits and desirable attitudes outranks the importance of the acquisition of knowledge in the elementary school. Caring for the teeth, actually keeping the mouth clean, going to the dentist at regular intervals, and sufficient knowledge to make the performance of these habits intelligent are some of our major objectives in an oral hygiene program.

There comes the time in the elementary school when accurate information must be supplied. *A Child's Book of the Teeth* supplies this information in a way that interests the children. The book is attractive in its appearance. The topics covered are those that are essential. The relation of food to good teeth is given emphasis that is most useful to the teacher. The book seems to be free from superstitious ideas that have a way of clinging and it is free from any flavor of commercialism.

An unusual feature is found in the fact that two methods of brushing the teeth are given. Since dentists do advocate both of these methods, the teacher is often at a loss to know what to say to answer the questions that arise. The chapter, "How to Take Care of your Toothbrush" gives information that is badly needed.

While the condensed directions are called "A Toothbrush Drill," page 84, there is no idea implied that drill is used in the ordinary sense of the word. A better name for this might be "demonstration." Demonstrations that actually show children an effective way of brushing teeth have real teaching value.

The illustrations by the author are clever and amusing and very instructive. One wonders why legends are not supplied for all figures. Since pictures are visual aids, descriptions or legends aid the teacher. Only 7 of the 126 illustrations are labelled. If the purpose of this omission is to make the child read, the omissions serve the purpose, but the teacher using this book as a reference would find the pictures most useful with the labels. The writer of this review feels that the cementum should have been indicated in the diagrams on pages 51, 63, 64, 65, 88, 89, etc. While the chief purpose of these illustrations is not to show structure, the parts of the teeth are indicated and the omission is confusing to the average child.

The book fills a decided need in the health education program. While the language of the book is within the un-

derstanding of third and fourth grade pupils, teachers of the fifth and sixth grades will find this book valuable for reference.

MARY MAY WYMAN
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OLD FOLK DANCES FROM NEW NATIONS. Edith M. Gates. (Clayton F. Summy Co., 1932), 32 pages. $1.00.

This volume brings to English-speaking people the figures and music of a number of old dances which for some time were almost lost to the folk whose customs, traditions, and character they expressed. The ancient lore of these countries, Estonia and Latvia, had dissipated during centuries of living under the influence of ruler nations. With the advent of their freedom after the World War, these new countries are enjoying again, largely under the direction of physical education teachers and associations, the dances which were so much a part of the life of many generations ago.

Through her foreign service in Y.W.C.A. work in these countries and in Russia and Poland, Miss Gates is exceptionally well fitted to interpret the dances of the folk with whom she has worked.

In her collection are five Estonian dances, gathered by Anna Raudkats—a native Estonian and a graduate in physical education—and five Latvian dances. A Polish Krakowiak and a Russian Peasant Dance are also included, partly because of the author's fondness for the countries where her first foreign teaching was undertaken.

The dances range from simple ones suitable for social groups to those with more intricate figures requiring greater agility and endurance. The informal style of explanation and notation, the translation of names into the English equivalent, the illustrations of dancers in native costume, the preliminary sketches, descriptive of the origin or character of each dance, the preservation of the unique harmonies and changes of harmony of the musical accompaniment make this book an interesting and practical one for both student and teacher.

CHARLOTTE G. MACEWAN
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TENNIS ORGANIZED FOR GROUP INSTRUCTION. Dorothy Davies Randall and Marjorie Hillas. (A. S. Barnes & Co., 1932), 165 pages. 26 illus. 37 diagrams. $1.60.

Instruction to groups in elementary tennis techniques with satisfactory results is the purpose of this book. It is designed for girls particularly and should be considered largely from this viewpoint. The necessity of formal arrangements with curtailment of freedom of full expression in the whole situation raise the difficulty of all group instruction. This group method of teaching tennis would not be satisfying if adequate facilities in the way of equipment and skilled assistance could be obtained. The great labor in giving individual instruction and the need of personal skills of the teacher in the individual method is so great that to find and suggest some method that will aid in handling larger groups effectively is a real contribution to the problem of teaching this popular game. It is stated by the authors that "learning to play a good game of tennis requires time" and instruction in groups is only intended to get pupils started in an elementary way. The great difficulty on the part of inexperienced pupils is to interpret accurately time, space, and force. These interpretations are of the highest kind in tennis and the authors have endeavored to aid in getting to this problem without discouraging the beginner. The problem, as stated by the authors, is to keep members active on few courts during the entire lesson, either as players or coaches. Twelve to sixteen players may be playing on a court but the suggestion is that no

more than twelve be allowed if possible. The first presentation is given by the teacher with the class in open order, then they are divided up into the practice groups. An example of the method suggested is: One-fourth of the group is practicing individually without using balls, the second group is tossing to a group of strikers and in addition they make suggestions to the strikers as to form and the various difficulties that are recognized. Another group gathers the balls that are knocked across the net. The order is reversed and changes are made so that every group gets experience in each of the divisions. Organization is fitted in to the skill desired according to the needs of the situation. This is made plain by diagrams and photographs.

The illustrations are in the main very good and the diagrams give many needful suggestions. The book shows evidence of the experience of the writers in the practical teaching of the subject. The simple diagrams showing angles in the singles and doubles are helpful as they give some of the basic principles on which the tactics are developed.

The collection of material in regard to tournaments is well chosen, especially that showing how byes should be drawn for elimination in the first round. Some good suggestions are made in regard to various types of tournaments, as the round robin, ladder, elimination, consolation, and bridge.

Only selected rules are given from the *Rules of Lawn Tennis,* as it is deemed necessary only to give those that are usually unfamiliar to many players. Out of the voluminous books on tennis of the present day only a few selected ones have been mentioned. The book is a good contribution to effective mass teaching of this highly skillful game, the mastery of which may give so much satisfaction over a long period of life.

JOHN D. BROCK
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SPECTATORITIS. Jay B. Nash. (Sears Publishing Company, Inc., 1932), 284 pages. $2.50.

Congratulations to the author of *Spectatoritis.* Herein is set forth a philosophy of life worth reading again and again. It contains food for daily meditation. *Spectatoritis* is one of the few books published whose ten chapters may be read during a single day, and yet impress one profitably for a whole lifetime. It is simply, clearly, and cleverly written.

With the author one enjoys the challenging query raised, can we be trusted with "leisure" in this machine age of our own day and civilization? With him one thinks seriously of the tendency toward the shortening "working" day as one among many current challenges.

"Why Play?" the author interestingly inquires. What shall one say in answer to this fascinating query? Well "it" is the chief answer. "It" as discussed in chapter II should be broadcast so that the whole world might hear of the dignity of "play" as it has been wont to hear about the dignity of "labor." A great idea is reflected by saying that "the attitude we take toward an act determines whether it be play or drudgery."

And, again, "What is work?" the author inquires. Upon reading chapter III one is agreed that "the play spirit of work comes only to the doer" and not to the mere on-looker. Because of the "joy" that is experienced during busy hours one easily assents to the expressed point of view, "Do not pity any man or woman who makes sacrifices for a chosen work." One feels, after pondering over these words written in chapter III, that work is really a sacred joy, and not an onerous daily burden. Paradoxically stated, it seems that a man's vocation might well become his chief avocation. The chapters entitled "What is Play" and "What is Work" justify the writing of the whole treatise and should be read by rich and poor, the high and the lowly.

Chapter IV on "Re-creation Not Wreck-Creation" is a novel treatment of "recuperation." By prescribing recreation for health's sake, and by commercializing recreation the hoped-for outcome is often totally lost. The "glide-stroke" relationship pointed out is worthy of serious consideration. "Craftsmanship in Leisure" one must agree, upon having read chapter V, is an important idea for every human being, for to induce man to "run toward creative arts rather than to boredom" is a great and worthy accomplishment. "When we say we have no time for the development of skills in creative art, we merely mean there are other things we prefer doing." "The essence of culture" which is art should be recognized as within the reach of all men versus the chosen few.

In chapter VI entitled "Building Normality" it is said that "normality is the outcome of a way of living." Overemphasis on abnormality has led many persons to believe that it is the rule rather than the exception among human beings. Positive emphasis on normality should be substituted for this overemphasis on abnormalities of life.

Chapter VII entitled "Keeping Young" *per se* appeals to everyone. But it is different than the one-time reported search of the "Fountain of Youth," for, says the author, "as long as one's way of acting, thinking, and feeling does not become sealed up there is youth."—"Youth is a state of mind —not measured by years but by a quality of imagination."

"Strip or Retire," as set forth in chapter VIII aptly places due emphasis on life's never-ending "struggle" which results in adding "life to years rather than" mere "years to life." "A doing existence" and "facing the current" is not a part of the life of "the victim of spectatoritis."

Chapter IX indicates "Ways Out," of pessimism. Not "commercial recreation" but the practice of the "creative arts" is one way out. And again, "education, not just schooling is the great antidote to spectatoritis," whenever constructive imagination is aroused. The development of lifelong "hobbies" is pertinently suggested as a profitable way out. It is rightly insisted that to delete from our public schools the creative arts in times of economic depression is a tragic event.

Chapter X encourages all individuals "to travel hopefully" on in the midst of the machine age which "frees us." But for what have we been freed says the author? Physiologically and neurologically considered, we are told that "fear-hope must be considered the moral equivalent of crime." The antidote to "boredom," "breakdowns," and sometimes "crime," lies in the participation in the creative arts, and in the development of the many-sided interests of life. The motto of this generation may well be that "the happy man, the healthy man, the normal man, the busy man are one."

One reads and reads this novel book, and then wants to pause and ponder, then reads and reads again and wants really to both "work" and "play" in the big broad sense portrayed by the author and thus be truly happy. The ten chapters of this fascinating treatise when read intermittently between busy hours, or consecutively during leisure hours will stimulate the reader to be different from the mere on-looker or "spectator" in all the various avenues of life. This book should be read the world around to stimulate individuals to make both "work" and "play" joyous and worthwhile. It is a most timely book that should be read both in periods of depression and of prosperity, by every individual everywhere no matter what his station or calling in life may be.

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HEALTH AND HOME NURSING. George Margaretta Douglas. (G. P. Putnam's Sons, 1932), 383 pages. $2.50.

Mrs. Douglas in writing her recent book, *Health and Home Nursing*, has

made a very timely contribution which should be particularly valuable in meeting the present economical and health need. The book, as the title indicates, incorporates the elements of health and the simpler nursing techniques and procedures which might be included in the curricula of high schools, normal schools, and colleges; however, as I see it, this book meets the peculiar need of that vast group of housewives or homemakers in the community who are perhaps closest to the health and sickness problems of the family.

The historical résumé, to which the first four chapters are devoted, is well written and should be of especial interest to lay persons less familiar with the evolutionary process of public health from the earliest days of "magic medicine" to present day scientific methods of disease prevention. To quote from the author, "The value to the practical person of any history lies not so much in what it tells him of the past as in the light it throws for him on the present."

The author has projected her own broad viewpoint of public health by the emphasis placed upon the responsibility of the "Home Nurse" or a responsible member of the household not only for the maintenance of health within that particular home, but for the maintenance of health in the community as well.

It would be extremely remiss not to comment on two other outstanding chapters: namely, the one that deals with medicine in the home and the wise warning against its all too prevalent use without a doctor's order.

The last chapter, and, because of its place in the book, the very strategic chapter, stresses the "wholeness" or "oneness" of the body and mind of the patient or individual and the consideration that must be given to both the physical and mental comfort of the one under care, if we are to hope for good results. Several very practical suggestions in the way of occupational therapy are included in this chapter

Lastly, the structure and organization of the book make it especially valuable as a textbook in group teaching. It contains lists of questions and activities, as well as suggested readings, after each chapter; there are many helpful diagrams and illustrations to be found throughout the book, and a most inclusive general bibliography at the end which should be helpful both to instructor and student who are interested in the most vital matter of health.

MARY J. DUNN
Professor of Public Health Nursing, Vanderbilt University, Nashville, Tenn.

PHYSICAL EDUCATION—PHYSIOLOGY OF EXERCISE. F. J. Lipovetz. (Burgess-Roseberry Company, 1932), 152 pages. Paper.

A rather detailed and systematic study of physiology of exercise as applied to physical education. It is a mimeographed book, intended primarily for students in physical education who have thoroughly mastered the principles underlying anatomy, physiology, and kinesiology, and secondarily for those interested in physical education research and investigation.

The book has fifteen chapters and is divided into two major sections: one Theory, the other Practice. The first part, Theory, is a highly technical discussion of such topics as: The Phenomena of Muscle Contraction; Chemical Changes of Contraction; The Phenomena of Muscular Action, Control and Movement; Equilibrium, Tonus and Tonus Reflexes; Nerve Mechanism of the Heart; Innervation and Chemistry of Respiration; and Localization of Brain Function and the Process of Learning.

In treating the various subjects, the writer has drawn from highly reputable sources in the field of physiology and psychology. The discussion on "Transfer of Training" in Chapter IX, is worthy of close scrutiny on the part of the physical educator, in view of the fact that the Doctrine of Formal Discipline is again coming to the front as a debatable issue.

In the division devoted to Practice, the author concerns himself with the following discussions: Definitions, Classification and Comparison of Exercises; General Effects of Exercises, such as soreness, stiffness, pulse rate, blood pressure, respiration, etc.; Effect of Special Type of Exercise Upon Body Function; Age Periods and Physical Education Objectives; Physiological Experiments; and Physical Diagnostic Technique and Methods.

Chapter XII on "Age Periods and Physical Education Objectives" is especially worthy of reading and understanding by the teacher of physical education. The material presented is basic to sound pedagogy, even though it may not be directly concerned with physiology of exercise.

In Chapter XIV the writer deals with a number of physiological experiments which offer a fertile field for more intensive study. The experiments were conducted with the aid of a number of students, and mention of a few of the investigations may be of interest to the reader: Functional Heart Efficiency Test; Hourly Heart Efficiency Ratings; Monthly Heart Efficiency of Girls—Women; Effect of Natural and Gymnastic Dancing; Effect of Cigaret Smoking on Pulse Rate of Men and Women; Effect of Showers on Pulse Rate, and a number of others.

The book contains many graphs and illustrations, but due to the fact that they are mimeographed many of the accompanying explanations are hardly legible. Despite this handicap, the book is a worthwhile contribution to the field and students and teachers may well study it with profit.

HARRY DIPPOLD
Glassport Public Schools, Glassport, Pa.

FOOTBALL LINE PLAY. Bernard F. Oakes. (A. S. Barnes & Co.), 258 pages, 35 diagrams, 141 illus. $4.00.

"This book was written to serve four purposes: first, as a text or reference book to be used by students—in coaching courses in football; second, for the use of coaches now in the field—with the hope that it will give them new ideas and aid them in coaching; third, for the use of beginning coaches as a reference; fourth, as a guide to school and college players."

These words from the preface of Mr. Oakes' *Football Line Play* state the author's purpose in writing the book. It is written in purely textbook style with no attempt to popularize the material for general reading. It is accurate, concise, and clear. Every phase of offensive and defensive line play is treated and the book is profusely illustrated with excellent photographs and diagrams supplementing the text. Further, many valuable suggestions as to the better methods of teaching and developing the special skills involved in line play are offered.

The author, apparently, leans rather more to power than to agility and speed in his conception of line play, particularly in his ideas on defensive technique. However, his ideas are sound and are backed up with successful experience.

Mr. Oakes' basic principles of football were learned at the University of Illinois where he played under the coaching of Robert C. Zuppke. He was associated in coaching with Major Robert R. Neyland at the University of Tennessee and with Ernest Berg and D. X. Bible at the University of Nebraska before going to the University of Montana as Head Coach. He particularly acknowledges the influence of these men on his football thinking.

The book is well designed to serve its purpose as a reference and guide to aid in coaching the special technique of line play. There is real meat in it for the serious student of football.

E. E. WIEMAN
Line Coach, Princeton University.

TAP DANCES. Anne Schley Duggan. (A. S. Barnes & Co., 1932), 110 pages. 13 illustrations. $2.00.

Tap dancing has become so firmly established as a part of the physical edu-

cation program in the recent few years that a book clearly written, representative, giving the best in the field, should meet with quick response on the part both of these younger teachers who have had an introduction, and to the older teachers who want to find a gate, to this field.

If, as T. H. Briggs has said, "the first duty of the school is to teach children to do better the desirable things that they would do anyway," then this book will help many a school to perform its first duty.

The foreword answers many of the questions that teachers of dancing have felt and have endeavored to answer in regard to tap dancing. Miss Duggan tells us the relationship of tap dancing to clogging and to folk dancing. She shows its origin and its peculiar values.

The introduction by Dr. Williams gives a suggestion as to the place of tap dancing in education.

The text itself is clearly written and contains suggestive material and pictures for costuming and properties. The twelve dances or "routine," are arranged in the book in order of difficulty and the table of contents lists them in the same order. The index table of "Dances for Special Occasions" is a unique feature and especially valuable for those called upon to cooperate in preparing programs for holidays, parties, or other occasions.

ANNA L. HUGHITT,
Oberlin College, Oberlin, Ohio

THE SCHOOL HEALTH PROGRAM. Report of the Committee on the School Child. Thomas D. Wood, M.D., Chairman. (Century Company, 1932), 400 pages. $2.75.

This volume should be within close reach of every superintendent, principal, director and teacher of health and physical education in this country. There is no other source available now which gives so concise and thorough a statement of the philosophy, policies, and plans of a school health program as this "series of summarized reports of twenty-four subcommittees organized under the general Committee on the School Committee." Every possible phase of the school health program is discussed clearly and, in the majority of the reports, standards and recommendations for the various services are suggested. A statement of the philosophy of education prepared by William H. Kilpatrick guides and suggests the function of the school health program.

The adoption and use of the recommendations and standards of these various committees would ultimately lead to the fulfillment of the Children's Charter—the goal of health education and service in the United States today. With such a ready and authoritative reference there is no reason why every school board and superintendent in the United States should not have a thorough knowledge of a complete school health program. There is little excuse for haphazard and unorganized attempts at this vital phase of the work of the public schools with this excellent source available to every administrator. Undoubtedly, *The School Health Program* will be adopted for textbook use in professional training schools so that the actual functioning of a thorough program of school health will be facilitated.

The findings reported in this book would probably require the work of a life-time for any one person to accumulate. Intelligent administrators and health workers will realize the value of such a compilation of health material and adapt it to their local situations.

ROSS ALLEN
Washington Junior High School, Rochester, N. Y.

PHYSICAL EDUCATION ACTIVITIES. Theodore Cramlet and Russell Hinote. (Dodd, Mead & Co., 1932), 302 pages. Illustrated. $2.00.

This book contains a wealth of material for the physical education teacher. It presents a collection of gymnastic and stunt activities to be used in an intramural program in secondary schools but

may be easily adapted to the programs of the Y.M.C.A., colleges, Boy Scouts, athletic clubs, or summer camps. The exercises are described and illustrated and cover a broad field, including tumbling, flying rings, horizontal bar, trapeze, pyramids, balancing, and juggling. The techniques on using the tight and slack wires are questionable and should be used with care. Suggestions are given for motivating the progress and a chapter deals with the construction of equipment.

The second part of the book is given over to the organization and administration of an intramural gymnastic program, covering such phases as directing the personnel, selection of participants, advertising, model programs, and suggestions for camps. A useful bibliography is also given.

The authors have done a fine piece of work in selecting and presenting the material found in this book. It is a mine of information for intramural directors who are looking for gymnastic material to incorporate in their programs. Too often this type of activity has been neglected in the intramural set-up, due largely to lack of knowledge in selecting and organizing such activities. This book meets the needs in such a situation. It will also be found extremely useful to the average teacher who desires activities of this type for class use. It should have a place on every physical education teacher's bookshelf.

HUBERT E. BROWN
Dept. of Physical Education and Health, School of Education, New York University.

CHARACTER EDUCATION THROUGH PHYSICAL EDUCATION. (Vol. III of Interpretations of Physical Education.) Edited by Jay B. Nash. (A. S. Barnes & Company, 1932), 315 pages. $2.00.

Character education is an important subject in physical education, and one in which we know in a scientific sense relatively little. In this book, it has been necessary to approach the subject from many angles, and the approach has been in many cases by men knowing relatively little about applications to physical education.

The number of papers, forty-three in all, has made it necessary to limit the space alloted to each contributor. This has rendered it difficult for many of the authors to present the subject assigned in a sufficiently thorough manner and frequently the reader feels that only a superficial treatment of the topic has been presented. In most of these cases, however, the author has written more fully elsewhere and bibliographical references are given to most of these more extensive treatments. This symposium offers an extensive introduction to the subject and an exceedingly useful general summary of the whole field.

Any subject presented in the form of a symposium will vary in the thoroughness of the treatment. This symposium is no exception. In the opinion of the reviewer, however, there is much less of the rambling rhetoric type of generalization than is usually found in a symposium, and there are only two or three sections in which the writer seems clearly to be out of his field.

The book first attempts to define character and does this from a variety of viewpoints. The second section treats of the bases of character. The next two divisions treat of physical education and character, and the individual papers vary considerably in value. Professor Lloyd's treatment of the criteria for evaluating physical activities for character education is particularly well done. This is followed by a number of applications to specific activities which in a number of cases seem rather spotty, and this section adds relatively little of value to the discussion.

The section on principles of methodology in physical education, a committee report, will repay careful study by any teacher in this field.

Finally, the section giving illustrative cases of the effective methodology in various fields of character education,

and Professor Nash's statement of the administrative procedure involved in character education through physical education, round out a very valuable compendium. A well chosen bibliography is appended.

C. H. McCloy
University of Iowa, Iowa City, Iowa.

The Child and Play. James Edward Rogers. (Century Co., 1932), 205 pages. $2.00.

What must be done to provide the child with play—that essential to his growth and development? Dr. Rogers sets out to answer this important question in *The Child and Play*.

The book is based on the reports of the White House Conference on Child Health and Protection, which doubtless was the most meticulous and extensive investigation into the welfare of children ever promoted. A careful reading of the lengthy reports of the Conference for the purpose of culling out the most valuable material on play is a task which the average worker would not find opportunity to complete. Dr. Rogers has selected from the reports the somewhat scattered material concerned with the part of play in education, and has thus made the Conference reports easily accessible to us all.

The White House Conference in its discussions predicted that the time will come when every boy and girl in America will have not only a safe and spacious place for play under trained leadership, but will also develop an interest in some recreative activity for use in leisure time. In other words, the Conference discerned two very distinct needs for play: "First, happy and normal play as a safeguard to childhood growth; second, play as an insurance against the threats of the adult future to the health of both mind and body." The author's purpose was to treat those two specific needs.

The book starts with a clear exposition of the various values of play, and continues with a discussion of our special needs today "in the light of the high-powered impact of new forces which have developed in our modern civilization." It treats the various aspects of recreation in the home and out of it, in the school, and on the playground. The book lists the child's impulses to play, and describes wherein institutions are meeting the needs, and in what particulars they fail. The important question of play leadership has been carefully and adequately handled, and detailed suggestions have been added concerning the various types of play.

The material is authoritative and thoroughly modern. One of its advantages is that it is a collection of opinions of the most prominent leaders in the country, interpreted by a man eminently fitted for the task because of his position as Director of the National Physical Education Service of the National Recreation Association, which takes him to every part of the country. The author has had opportunities open to very few to know at first hand the status and problems of recreation in the various states of the Union. In addition, he has been from the outset one of the leaders in the play movement in the country, as well as an authority of national prominence in the general field of physical education.

Through its comprehensive treatment of all the methods of satisfying the play impulses of the child, the book should prove of value to teachers, parents, and others whose time is given even in part to the welfare of children.

C. D. Giauque
Director of Physical Activities, Boston University.

The Art of Being a Woman. Olga Knopf. (Little, Brown & Company, 1932), 307 pages. $3.00.

This is a significant book on the subject of woman, and will enlarge the scope of the steadily increasing library in this field. Written by a woman who one realizes is a thorough student of the subject, it will carry greater

weight than many another similar book. Dr. Knopf was one of the first women to go through the medical school of the University of Vienna. Her early interest in psychology changed from the emphasis given to measurements and tests to a desire to learn more about the real human being as an individual. After several years in the practice of gynecology, this same interest again manifested itself in greater concentration on modern psychiatry, and she now devotes her entire time to medical psychology. Her work as a pupil of Dr. Alfred Adler is occasionally evident in her book.

Part One is perhaps the most interesting to the non-technical reader. In it the author discusses in a very readable style the racial history of woman, the development of the female child, and the main problems of the girl and woman in adjusting themselves to the present civilization. The problems confronting every human being are grouped into three classes—the problem of social adjustment, that of occupation (under which she includes the activities of leisure as well as of work), and that of love and the relation with the other sex. Under one or the other of these headings may be placed all the difficulties that confront an individual. A note of encouragement for the solution of these problems is given, and is to be found throughout the book, with the belief that with proper training and a sensible technique a method may be found which will not only bring happiness to the individual but serve the welfare of others.

Part Two, which is the main section of the book, and the part for which Dr. Knopf's experience has doubtless furnished the background, treats of the sexual development and adjustments of the female child, the adolescent girl, the married and unmarried woman, and the mother. This whole section must be an exceedingly valuable contribution to the literature of psychiatry, giving as it does the viewpoint of one who is a woman as well as an authority.

There will be found some opinions and ideals which are new or at least radical to many readers. For instance, Dr. Knopf believes in equality of occupation for all, and that it is possible for a woman to run a home successfully and have at the same time an occupation outside of it. Again, "There is no physical crisis in adolescence; it is a period of growth and development like any other . . . It is merely that the three problems of life are confronting the child more immediately; and if he has been badly prepared to meet them the faults in his style of life will reveal themselves more plainly." The point is stressed frequently and with many illustrations that it is the attitude developed in early childhood which influences the adult. In speaking of the popular belief that a child is injured by the so-called "street explanation" of sex acquired from playmates, she says, "Of course it is best if the child has no need to learn from such a source; but the dangers of the 'street explanation' are vastly overrated. No child was injured by the remarks of his comrades who was not already prepared to misinterpret."

The recapitulation of the chapter "Women at Work" will give us much of Dr. Knopf's philosophy: "That women are proving themselves increasingly more efficient in any kind of work they happen to be really interested in. If the standing of women were really to be based, from the start, on a true equality with men, then there would be nothing they could and would not accomplish. Up to now, however, women have made the mistake of believing that they must prove that they can carry through any task as though they were men. By doing so they create for themselves a serious obstacle. From the very beginning, from the cradle, we must convince them that the sexual rôle cannot be changed and that it is not in fact a disadvantage to be a woman. Women should be glad they are women; they would not then feel a dislike for the peculiarly feminine tasks. There would then be no distinction in value between masculine and feminine

occupations: the question of prestige in the kind of work done would never arise. If there were a true equality, then each individual would be esteemed for doing the kind of work for which he or she was best fitted, according to physiological equipment and past training. If there were any question of merit, it would rest upon the degree of courage and social interest with which they carried out and pursued their occupation."

FLORENCE A. SOMERS
Waltham, Mass.

CORRECTIVES IN DANCE FORM. Perry-Mansfield. Book Two, CRESCENDO. Exercises by Portia Mansfield, Music by Louis Horst. (J. Fischer & Bro., 1932), 8 pages. $2.00.

This book is the second volume by Perry-Mansfield following the earlier work of *Individual Exercises*. It contains a series of group exercises which are rich in variety and interesting because of the effective patterns. They would undoubtedly be stimulating and pleasurable to the performer, and thus serve well for the purpose intended, namely: for reducing and body building, designed to attain an efficient and beautiful body in everyday life.

The title of the book is misleading, however, because of the word "Correctives." The term correctives is commonly used for exercises planned to fit individual needs. These may range from mild defects of mechanical body balance to more severe defects of an orthopedic nature in which structural changes and impaired functioning of the body occur. For such conditions this work is not suitable since it does not furnish individual exercises for special needs. Furthermore, the exercises given are far too difficult and too strenuous for most persons with such defects.

For general body mechanics, for developing, or reducing, the book will be a good addition to the professional library.

The music is by Louis Horst, which means that it is admirably fitted to the exercises and a great help in doing them.

FLORENCE A. MEYER
Board of Education, Newark, N. J.

CHARACTER EDUCATION. The Tenth Yearbook of the Department of Superintendence. (Dept. of Superintendence of the N. E. A., 1932). 536 pages. $2.00.

In producing *Character Education* the Department of Superintendence has performed a highly significant service, not alone for education, but it is to be hoped, ultimately, for society in general. As mankind moves into a new age of civilization with its accompanying overthrow of tradition, taboo, and authoritarianism in the realm of human conduct, there arises a serious question of whether this new society will not destroy itself before it is again able to set upon a course of reasonable safety guided by allegiance to worthy social-moral values and standards of conduct.

In the face of this problem the authors of *Character Education* have brought together in one volume, and in a very comprehensive and logical fashion, the best modern thought about the nature of character, of its significance to social welfare, and of the agencies of character education, with particular emphasis upon the problem of utilizing the activities of the school for purposes of character training.

Considering the immense amount of twaddle current in the literature of the day with reference to the subject, it is encouraging to find in the very beginning of this study the statement that, "No attempt is made to present a curriculum or set of curriculums for character education as such. However an attempt is made to present points of view which, it is hoped, will stimulate thought and discussion in the direction of a more constructive school life, and, in fact, a more constructive life in general." In addition to the points of view referred to, there is to be found in the book much valuable factual material and many references to sources. The

student of character education will be interested particularly in Chapter V, Research Related to Character Education, and in Chapter XVI, Tests and Measurements in Character Education.

"As many values as possible for as many persons as possible over as long a time as possible," is rapidly coming into general acceptance as the criterion of the good life. All who are interested in the development of a type of education that will emphasize this way of living are certain to find *Character Education* an interesting and valuable work.

EUGENE W. NIXON,
Professor of Physical Education, Pomona College, Claremont Colleges, Claremont, California.

VAULTING. Thomas McDowell, Oxford University Press, 1932. 45 pages, 75c.

This compact little volume entitled *Vaulting* must not be judged by its size. It treats of one subject, or rather of one phase, of physical activity which is most pleasurable and profitable to the participant. Much has been crowded within its forty-five pages. Its treatment of the subject is concise and to the point. The author has avoided both verboseness and entangling nomenclature in the description of the exercises. Although the terminology differs slightly from that to which we are accustomed, it presents no difficulty. Many appropriate sketches and diagrams supplement the text.

The pieces of apparatus ordinarily used include the Swedish Vaulting Horse, Vaulting Box, Vaulting Buck, and Mats. These pieces of apparatus are used singly or in combination.

The paragraph on "Standing By" or assisting the performer is a most timely one. This factor is of much importance to the safety of the performer on any piece of apparatus and cannot be ignored. The degree of difficulty of the exercise to be performed in terms of the ability of the participant is rightly emphasized.

A number of students after being permitted a rapid scrutiny of this little book concluded it worthwhile in that it dealt specifically with vaulting, thereby facilitating the search for information which is usually less completely treated in much larger volumes covering a variety of physical activities.

I do not mean to imply that this volume is indispensible to the teacher or leader of physical education activities. Most trained teachers have had a practical training in various forms of vaulting and present their type of activity in schools and other institutions equipped with apparatus. It is, however, a handy and practical reference.

FREDERICK PROSCH
Professor of Physical and Health Education, Temple University, Philadelphia.

FUNDAMENTALS OF PERSONAL HYGIENE. Walter W. Krueger, Ph.B. (W. B. Saunders Company, 1932). 291 pages. $1.75.

This convenient manual deserves careful reading and wide acceptance. The "fundamentals" seem well selected and the material in each chapter is well arranged. One especially commendable feature of the treatment is the emphasis upon applying to life the principles enunciated, thereby stressing the art of hygiene rather than mere science or knowledge of the facts. The author shows an intimate knowledge of physiology and introduces just enough of this to enable the student not prepared in that basal subject to understand reasonably well the significance of the hygienic procedures advocated.

In make-up the text is attractive, illustrations are commendable, the topic headings stand out conspicuously, each chapter is completed by a series of questions for class discussion and a very well selected bibliography, which consists in the main of texts and is lacking in that it does not give page references. In several cases these texts are referred to as footnotes, which seems a duplication of the title in the bibliographical list.

The range of subjects includes the following: Posture, Feet and Their Care, Value of Physical Activity, Skin, Clothing and Air in Relation to Health, Nutrition, Weight, Sunlight and Health,

Mental Health, Recreation and Rest, Health Fads, and Prevention of Common Diseases.

There are always questions relative to the relation between physiology and hygiene, for instance, the author claims (p. 37) that "long-continued contraction or stretching causes muscles to lose their tone." This probably needs qualifying since muscles functioning in either form of contraction may still develop a high degree of strength and tonicity. The percentage of the body tissue consisting of muscles, is placed by the author at about 50 per cent. This is frequently placed somewhat lower. There may be some difference of opinion with regard to the author's statement (p. 130) that "At intermediate temperatures (65°–68°) humidity has little effect." These are samples of points upon which there is room for difference of opinion.

One wonders why certain references such as the table on page 172 are for women and why other parts of the text are written as if prepared particularly for women. It leads one to suspect that parts of the text have been prepared by those whose service is recognized on page 11 of the preface, and that it has not been carefully edited to make the references uniform throughout the publication.

But the general make-up and contribution of the text is so wholesome that it deserves high commendation.

G. B. Affleck,
Int. Y. M. C. A. College,
Springfield, Mass.

The Child and the Tuberculosis Problem. J. Arthur Myers, Ph.D., M.D., F.A.C.P. (Charles C. Thomas, 1932). $3.00.

Dr. Myers has given us another valuable contribution to the literature on the prevention of tuberculosis in childhood. He has covered the subject with a thoroughness and lucidity which should commend it to everyone seeking a solution to this difficult problem. Here is no ordinary book of propaganda platitudes or textbook tabloids. It is a human document replete with personal experiences and based upon the most recent scientific procedures in diagnosis and treatment. It exposes the fallacies of much that has passed in the name of anti-tuberculosis measures.

In concise non-technical language Dr. Myers proceeds step by step to develop a practical program for prevention. He emphasizes that tuberculosis is a highly communicable disease; although it may take considerable time to manifest itself by definite signs and symptoms. The chief sources of infection are the tuberculous cow and the tuberculous human. Both of these undoubtedly have played leading rôles in childhood infection.

Dr. Myers commends the part played by the veterinarian in the control of bovine tuberculosis. The value of area testing for tuberculous cattle and the pasteurization of milk can scarcely be overestimated. A further "solution of the problem lies in the understanding and application of the present knowledge; namely: (a) infection can be detected by the tuberculin test; (b) infection always exists before clinical disease appears; (c) childhood type of tuberculosis develops first from infection; (d) this type is generally well controlled in childhood: (e) yet this type prepares the way for adult disease; (f) the adult is the highly destructive type of tuberculosis. Hence proper treatment of first infection or childhood tuberculosis must be instituted. . . . The public must be tested with tuberculin and x-ray examinations to discover those whose bodies harbor tubercle bacilli. The master-key to the situation lies within our hands, but the use made of this key depends upon the cooperation of the public."

A much needed word of caution is given to physical educators in the statement that "the girl or boy who is extremely active physically, and even engaged in all major forms of athletics, apparently is just as apt to have x-ray evidence of tuberculous disease as the girl or boy leading a more sedentary life."

In the introduction Dr. Shepard drives the wedge right home in the statement, "School administrators who have been satisfied with their fresh air preachments

and physical education programs will find food for thought in Dr. Myers' comparison of fresh air with fresh milk and fresh water, neither of which is fit for human consumption until properly safeguarded. A few physical education teachers may be startled by the suggestion that regular hours of rest may be as important for the school child as regular hours of exercise."

Every teacher and physical educator throughout the country should be required to study this impressive book and to take a searching examination upon it.

RICHARD A. BOLT, M.D., D.P.H.,
Director of the Cleveland Child Health Association.

FUNDAMENTAL ADMINISTRATIVE MEASURES IN PHYSICAL EDUCATION. Frederick Rand Rogers. (Pleiades Company, 1932) 260 pages. $2.75.

As the title implies, the presentation is concerned with the establishment of the fundamental administrative measures in physical education. Part I presents the arguments for measurement, and for particular measurements in physical education. The criteria for proper measurements emphasizes a point which in some cases has been neglected — that of the need for students' interest. The brief treatment of statistical procedures contained in two sections of the book introduces the reader to terms and meanings, but it is not intended to serve as a text in this connection.

On the basis that the primary purpose of physical education is physical development and that its major objective is "the protection and development of a sound body," the author develops the necessity of measuring in physical education those aspects of the "condition of the organism" which most correctly reflect the development of a sound body expressed in terms of physical fitness.

Briefly analyzing the respective merits of the available tests the author proposes the following as the measures of present concern to the physical educator: (1) Medical examination to determine defects; (2) Measures of special structures and functions, i.e., posture, feet, vision and hearing, and intelligence; and (3) Measures of physical capacity by means of the Rogers' capacity tests.

The reviewer has the impression that the author is too anxious to prove the merits of the Rogers' Test of Physical Capacity and its Strength Index. This part of the treatment leaves the impression of bias rather than of a systematic evaluation of all available material. Re-establishing the logic presented in a previous work (*Test and Measurement Programs in the Re-Direction of Physical Education*) he arrives at the conclusion that, "as a general measure of all-round skill probably no measures have higher validity than those of strength." Further, that the Strength Index is a very highly valid measure of general athletic ability.

Once the argument for the measures to be presented has been established, the book moves smoothly forward to the presentation of the measures and their administration in Part II and III respectively.

The chapter on the medical examination presents excellent material, particularly for the numerical scoring of defects. In a terse and concise manner the measurement of posture, feet, vision, hearing, and intelligence is presented and amply illustrated. The author brings the logical arguments for the validity of his physical capacity test up to date and amplifies with institutional and case study data that have been accumulated during its use in various schools, largely in the State of New York.

A complete administrative "set-up" is presented of the organizational procedures for the conduction of the measures of physical efficiency, i.e., (1) the medical examination (2) physical structures and functions and (3) "Rogers" physical capacity test. The problem of meeting students' individual needs, the classification of pupils, special cases, and sex differentiation are discussed with recommended administrative procedures.

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Requirements for Graduation

Completion of 31 semester hours of work on the graduate level in
to fulfillment of undergraduate professional requirements. Courses
include:

Physical Education Seminar: Covering advanced and original work.

Character Education: Discussions and examination of the literature
subject.

Experimental Physiology: General Survey with selection of individual
by student.

Experimental Physics: Study particularly of Physics in relation to
mechanics.

Thesis: An experimental study of some essential topic.

40 Students in Graduate Division of Summer School for 1929.

20 Graduate Students during current year, 1929-1930.

400 men in the undergraduate department during the current year.

J. H. McCURDY, A.M., M.D., M.P.E., *Director*
GEORGE B. AFFLECK, A.M., M.P.E., *Associate Director*
JOHN D. BROCK, M.Ed., *Secretary*

Write to the secretary for Printed Matter and Application Bla